Railway Engineering Maintenance

THE P & M CO

Published monthly by Simmons Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.

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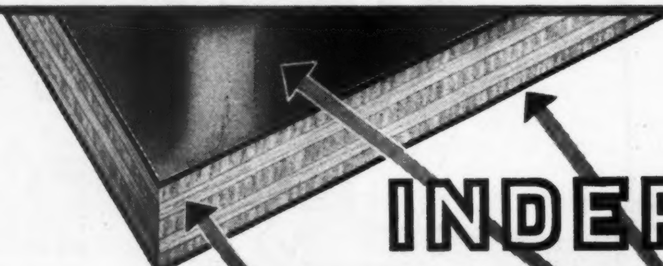
it's BOTH . . . A Plastic-Faced Plywood



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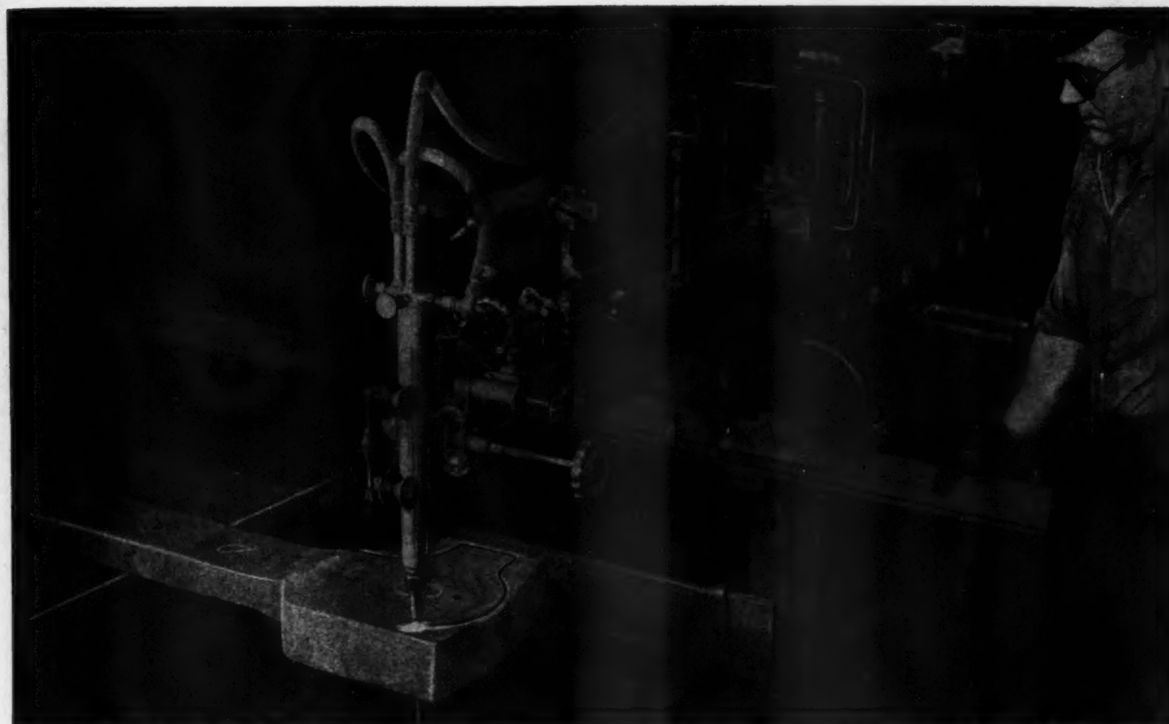


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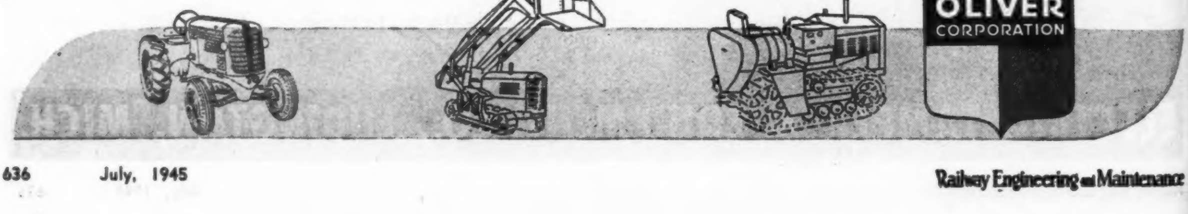
OLIVER - Cletrac

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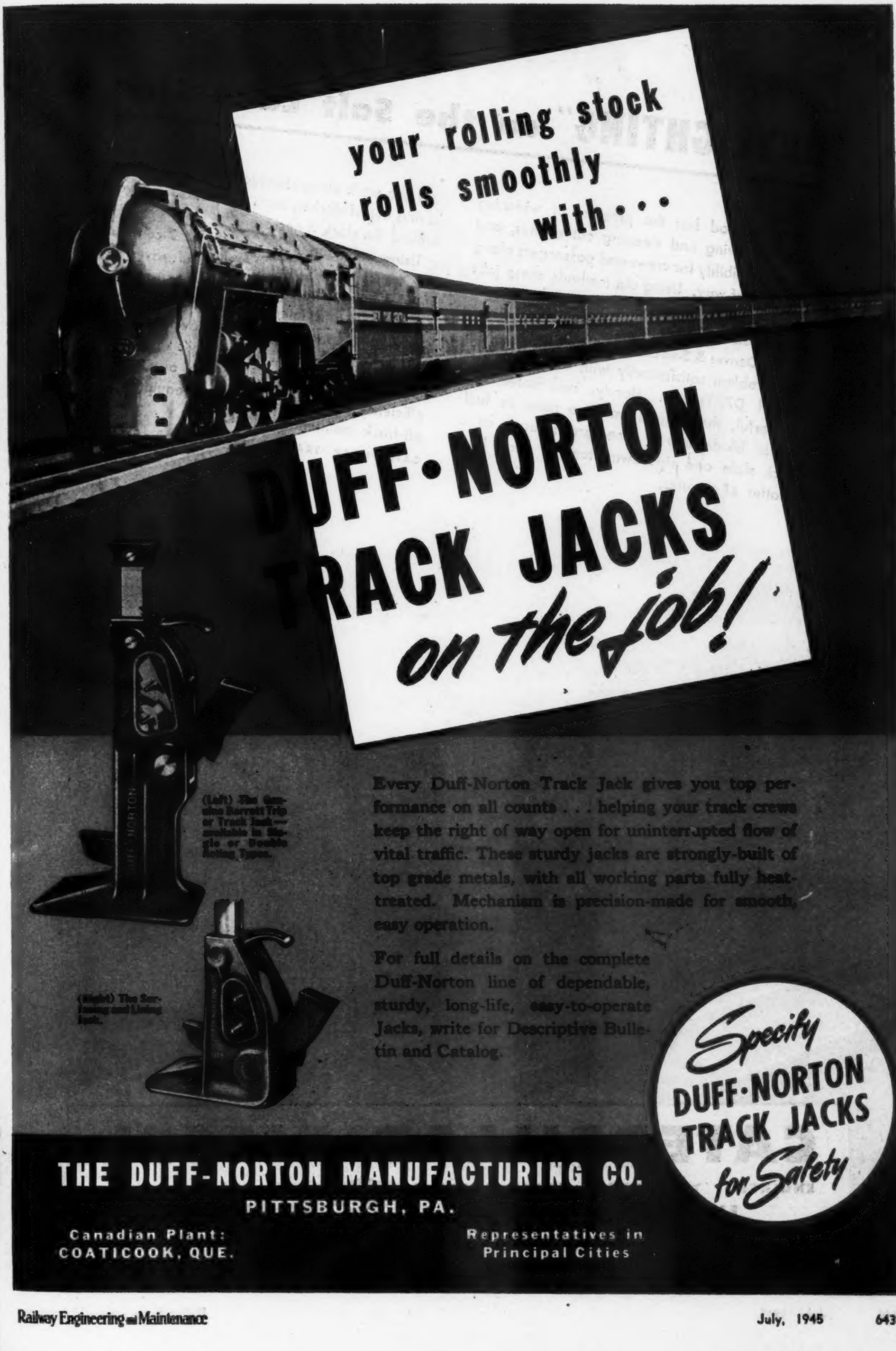
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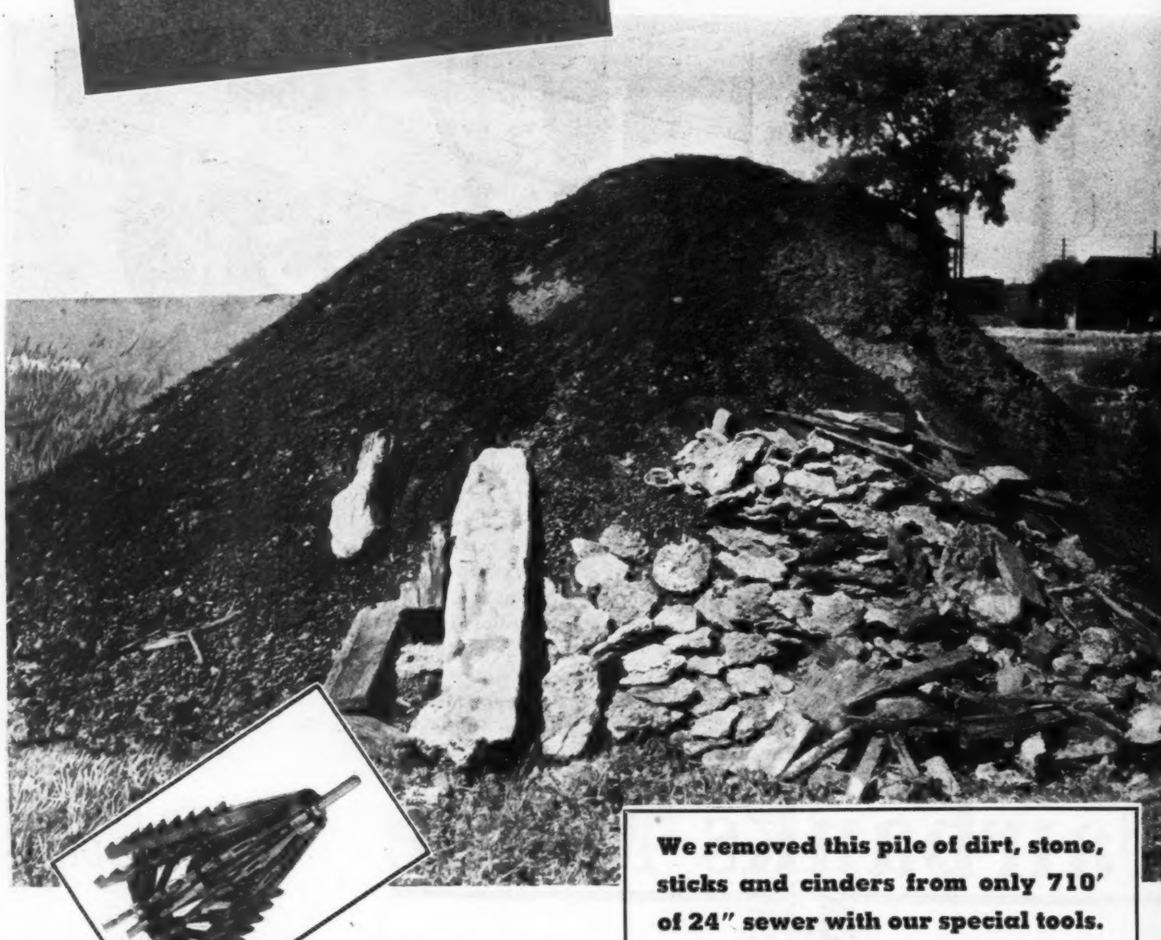

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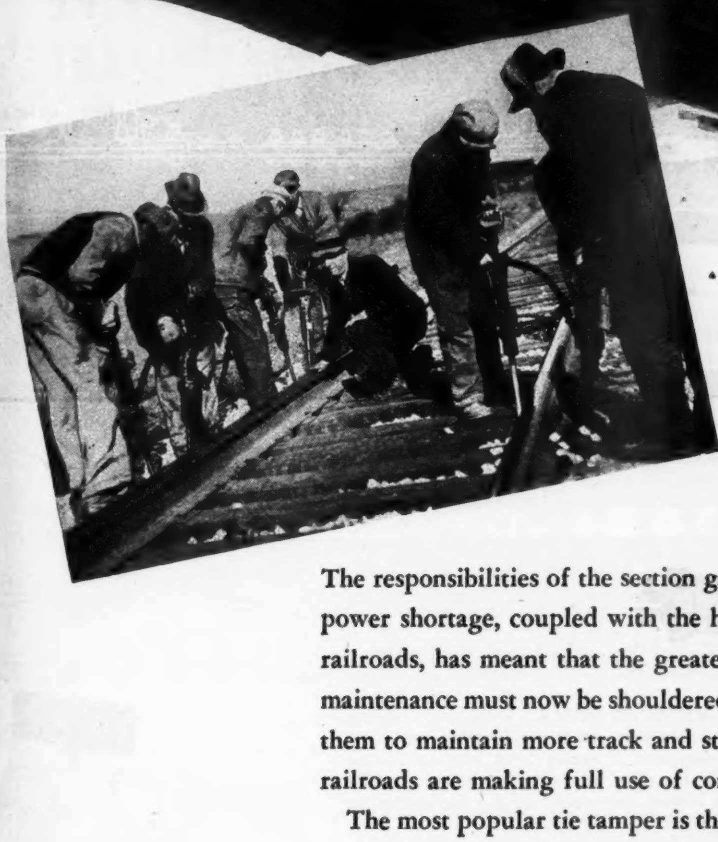

solve a SECTION GANG *problem*

The responsibilities of the section gang have greatly increased. The man-power shortage, coupled with the heaviest schedules ever carried by the railroads, has meant that the greatest portion of the all-important track maintenance must now be shouldered by the small section gang. To enable them to maintain more track and still turn out high-quality work, many railroads are making full use of compressed air power and air tampers.

The most popular tie tamper is the Ingersoll-Rand Model MT-3, which weighs only 42 pounds complete with bar. It has sufficient power to tamp the heaviest ballast under any condition of lift. A section gang using MT-3's and a modern I-R track compressor can cut surfacing time 50-60%. Certainly such performance warrants your serious consideration.

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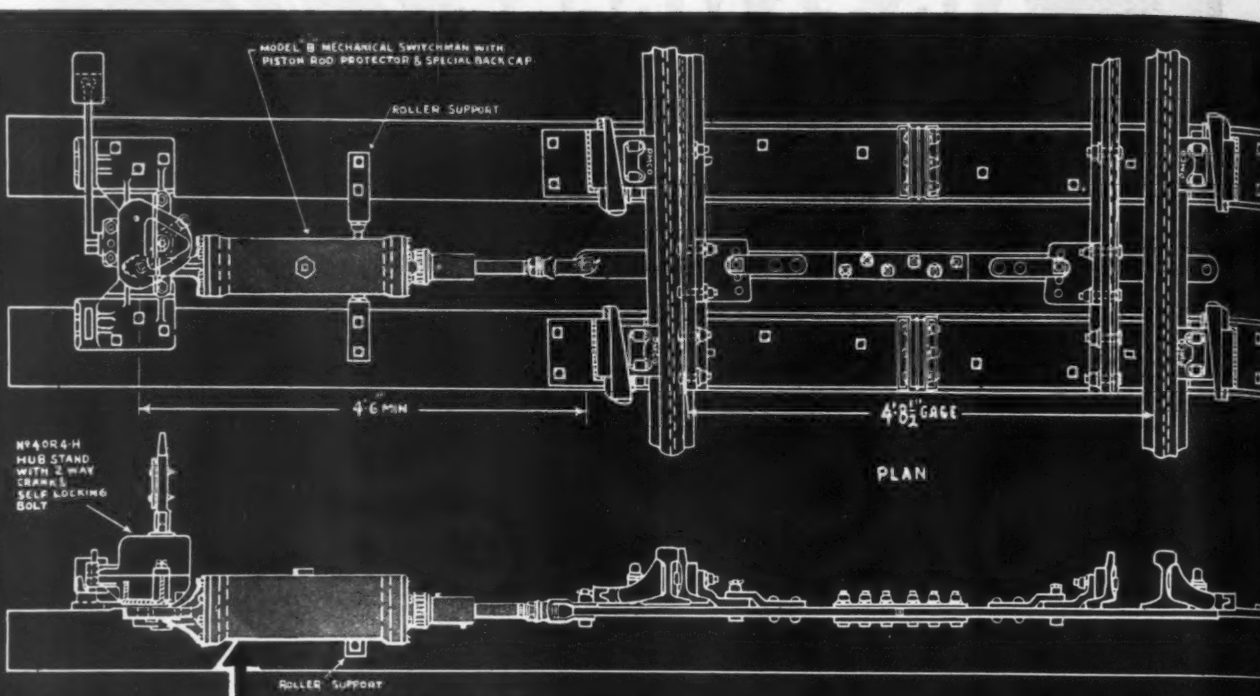
Performance Improved By New Layout

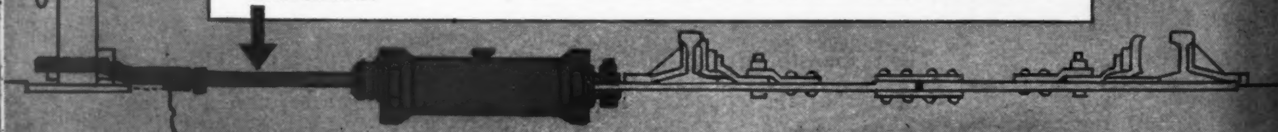


IMPROVED LAYOUT OF MECHANICAL SWITCHMAN

The Mechanical Switchman is reversed from the conventional position. The cylinder assembly is fixed to the crank of the stand and remains stationary, except for hand operation, thus reducing the frictional load on the plates and eliminates pulling the weight of the cylinder.

CONVENTIONAL LAYOUT OF MECHANICAL SWITCHMAN

The piston rod is fixed to the crank of the stand and the spring pulls the weight of the cylinder assembly in addition to the frictional load on the plates established by supporting the weight of the cylinder on the No. 1 rod.



1—REDUCED SPRING LOAD. The heavy end of the device when supported largely by the No. 1 head rod necessarily "holds down" the points on the plates, setting up a frictional load, effective while returning the points to the stock rail.

Supporting the heavy end of the device on the crank of the stand and roller support, substantially reduces this frictional load.

In the conventional layout the piston rod is fixed to the crank of the stand, and the spring pulls the weight of the cylinder assembly in addition to returning the points to the stock rail.

Reversing this position, the cylinder assembly is fixed to the crank of the stand reducing the additional weight pulled by the spring to that of the piston rod only.

2—REDUCED WEAR. Piston and cylinder wear should be substantially reduced by both the reduction of spring load, and by moving only the piston rod within the cylinder rather than moving the weight of the device on the piston rod.

3—REDUCED VIBRATION. In its customary position, the heaviest portion or back cap end of the device is attached directly to the No. 1 head rod, subjected to the vibration at that point.

When the Mechanical Switchman is reversed, vibration of the switch will be dissipated in the piston rod before reaching the body of the mechanism itself.

NO. 4 HUB STAND—available in low or intermediate heights, is especially adapted for use with the Mechanical Switchman. Its dead center throwing arrangement and advantageous lever ratio facilitate accurate signal adjustment and adequate pressure of the point against the stock rail.

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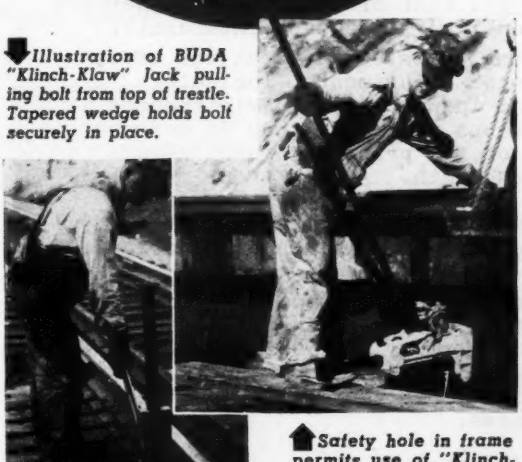
Illustration of BUDA "Klinch-Klaw" Jack pulling bolt from top of trestle. Tapered wedge holds bolt securely in place.



Safety hole in frame permits use of "Klinch-Klaw" Jack with rope support for removing cord bolts from the sides of beams.

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No. 199 of a Series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO 3, ILL.

Subject: Your Fellow Readers

Dear Reader: July 1, 1945

Did you know that at any time, through periodic audits made by the Audit Bureau of Circulations, you can know exactly how many subscribers there are to Railway Engineering and Maintenance? The figure disclosed at any time may not mean as much to you as a railroad man as it does to our advertisers, who want to reach you with their messages, but I am sure that it will be a source of some satisfaction to you to know that you are sharing with the large majority of railway engineering and maintenance officers over the country the information which we bring to you from month to month.

A recent careful check by our circulation department shows that of the engineering and maintenance officers of the rank of assistant supervisor and above on the Class I and more important Short Line railroads of the country, as listed in the Pocket List of Railway Officials, from 80 to 100 per cent are readers of Maintenance. Among the various classifications of these readers, coverage includes 96.6 per cent of the executive officers in charge of engineering; 98.4 per cent of the chief engineers and their immediate assistants; 100 per cent of the chief and assistant chief engineers maintenance of way; 88.5 per cent of the engineers and assistant engineers maintenance of way; 100 per cent of the principal assistant engineers; 88 per cent of the assistant engineers; 94 per cent of the district and division engineers; 80 per cent of the engineers of track; 90 per cent of the general roadmasters; 92 per cent of the roadmasters and assistant roadmasters; 87 per cent of the track supervisors and assistant track supervisors; 93 per cent of the superintendents of work equipment and maintenance of way shops; 98 per cent of the engineers of structures and design; 94 per cent of the supervisors of bridges and buildings; 93 per cent of the master carpenters; and 98 per cent of the water service engineers and superintendents.

Add to these the known readers among other classifications of officers in the engineering and maintenance departments, including valuation and office engineers, general inspectors, superintendents of treating plants, etc., and the check shows that more than 93 per cent of all officers in these departments of the principal roads of the country share Maintenance with you each month. And to these must be added a large number of readers among executive officers, operating officers and those in the purchasing and stores departments, who want to keep informed on up-to-date engineering and maintenance practices, equipment and materials.

I am sure that you will agree that this is an enviable record of coverage for any publication. To us of the editorial staff seeking to serve you, it is a source of great satisfaction. Indeed, to us it is much more than that—it is a challenge to maintain constantly a standard and breadth of report that will merit your continued, and still more intense, interest in our pages.

Sincerely,

Neal D. Howard
Editor.

NDH:JB

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Published on the first day of each month by the

SIMMONS-BOARDMAN PUBLISHING CORPORATION
105 West Adams St., Chicago 3

NEW YORK 7, 30 Church Street

CLEVELAND 13, Terminal Tower

WASHINGTON, D.C., 4, 1081 National Press Bldg.

SEATTLE 1, 1033 Henry Bldg.

SAN FRANCISCO 4, 300 Montgomery St.

LOS ANGELES 14, 530 West 6th St.

DALLAS 4, 4518 Roland Ave.

Subscription price in the United States and Possessions and Canada, 1 year $2, 2 years $3; foreign countries, 1 year $3, 2 years $5. Single copies, 35 cents each. Address H. E. McCandless, Circulation Manager, 30 Church Street, New York 7, N.Y.

Member of the Associated Business Papers (A.B.P.) and of the Audit Bureau of Circulations (A.B.C.)

PRINTED IN U.S.A.

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

July, 1945

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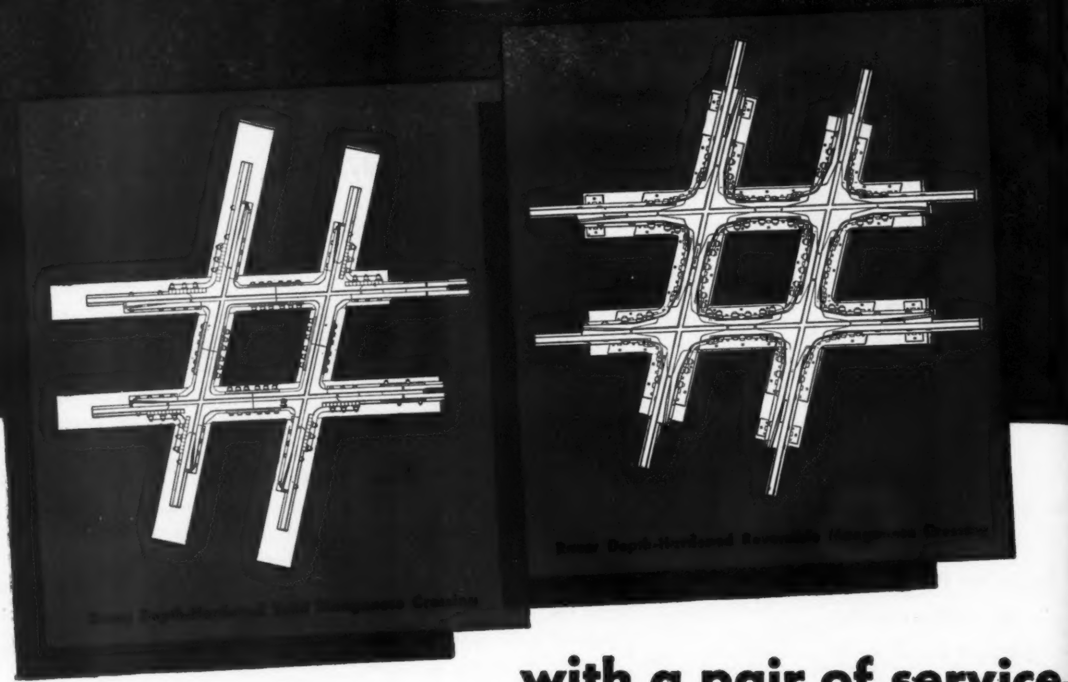
A PAIR OF RACOR CROSSINGS



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When you use a Racor Solid Manganese Crossing or a Racor Reversible Manganese Crossing, you benefit by two features developed by Ramapo Ajax to insure continued smooth-riding traffic at busy intersections.

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Railway Engineering and Maintenance

A "Citation"—

From the President of the United States

Since the satisfaction of achieving results is a necessary incentive to long-sustained intensive effort, it is important that railway men, upon whom so many responsibilities rest these days, raise their heads from their work long enough to visualize the outstanding achievements in rail transportation in recent years, and through these achievements take renewed stimulus, strength and encouragement for the heavy task that lies before them. The ultimate goal toward which railway employees have always striven is adequate and efficient rail transportation. Since the onset of the war, with the success of the war effort at stake, railway men have been striving to attain that goal as never before. What have been their achievements in that direction?

In freight transportation, the railroads performed 785,509,000,000 net ton-miles of service in 1944, an all-time record. In 1920, this figure was only 449,125,000,000. In 1929, the year of peak loadings prior to the economic depression, it was still only 492,313,000,000. At the low point of the depression, in 1932, this figure dropped to 259,049,000,000, and in 1939, the last peace-time year that was unaffected by the defense program or by war production, it had climbed back to only 364,723,-000,000. Space will not permit a detailed comparison of the relative efficiency of freight handling operations in all of these years, but that there has continued a marked upward trend in practically every category by which efficiency can be measured, especially in recent critical years, is evident in comparisons of a few of the indexes of such efficiency for the years 1939, 1943 and 1944.

In 1939, net ton-miles per train-hour were 13,450. By 1943 they had risen to 16,997, increasing still further to 17,621 in 1944. Net tons per train rose from 813 in 1939 to 1,116 in 1943, and to 1,138 in 1944. The average number of cars per train rose from 48.5 in 1939 to 52.1 in 1943, and to 53 in 1944. Even net tons per loaded car rose from 26.9 tons in 1939 to 32.7 tons in 1944.

As to the passenger transportation rendered by the railroads, there is no better index than revenue passenger miles, a figure which reached the all-time peak of 95,575,196,000 in 1944. This was more than twice the number of revenue passenger miles of service in 1920, and was well over four times the 22,657,243,000 passenger miles handled in 1939. And of the greatest significance, all of this largely increased volume of traffic, both freight and passenger, has been handled in spite of acute restrictions on the procurement of locomotives and cars, and under war conditions generally which have tended to hamper railway operations.

In view of the foregoing facts, it comes with little surprise that, supplementing repeated commendation of the railroads and railroad men by high officers of the Army, Navy and other branches of government, the President of the United States has singled them out for commendation. In a letter to Col. J. Monroe Johnson, director of the Office of Defense Transportation, which is reproduced on a following page, the President writes in part as follows: "I am asking you to extend my congratulations to all of our transportation agencies—and their millions of workers—on the results that have been accomplished."

This is well-deserved commendation, in which every loyal employee on the American railways may take justifiable pride and derive stimulus for the difficult task that still lies ahead—one that is characterized by the President in his letter as, "the most gigantic task in all the history of transportation."

Sun Kinks—

Traffic Must Be Protected in Reballasting Work

TODAY, as never before, it is necessary that railway traffic be protected against accidents. At the same time, track work must be carried out with a minimum of delay to trains. This situation places an unusually heavy responsibility on those foremen doing reballasting work under traffic in hot weather, for there is always a possibility that track that has been skeletonized or given a high raise on loose ballast during extremely warm weather, without being adequately filled in, may develop "sun kinks" ahead of or under a train, causing a serious derailment.

There are a number of precautions that can be taken against such derailments. In the first place, track that is being skeletonized, or track that has been raised and not filled in, should be protected by a slow order. Secondly, despite the protection of a slow order, all possible measures should be taken to prevent uncontrolled rail expansion, which causes sun kinks. Theoretically, if the right amount of expansion is allowed when the rail is laid, if sufficient anti-creepers are applied to prevent the rail from running, and if none of the joints are "frozen", there would be no sun kinks. Unfortunately, all of these conditions seldom exist, and precautionary measures must be taken.

One such measure is to loosen any joint bars that are frozen as the day becomes warmer, to let the space between rail ends close. During a hot day, joints that remain open are probably frozen, and the act of assisting them in closing will remove a considerable amount of pent-up compressive stress due to expansion.

Another method of protecting against sun kinks during reballasting operations is to make certain that all anti-creepers for a considerable distance each way from the work are properly adjusted. This should be done during the early morning hours, before it becomes hot, and in such a manner as to prevent the rail from running toward the section of track to be skeletonized during the day.

A third precaution is to keep the track filled in with new ballast as close behind the skeletonizing forces and tampers as possible. If it is not possible to do this, it is at least desirable to fill in all track before the close of work each day so the slow order can be removed until the following day. It is also important in hot weather to keep the track in good alinement while surfacing.

When surfacing in double- or multiple-track territory, it is best to work against the current of traffic, so that the braking action of trains approaching the newly surfaced section will be largely dissipated on track that has been undisturbed. Otherwise, trains will approach the newly ballasted section on recently surfaced track in which the ties have not become securely bedded and the braking action of the trains will tend to pull the rail forward until the comparatively unyielding section of track that has not been surfaced is reached. At this point, if expansion has not been controlled properly, or the tie cribs have not been kept well filled in, the track is liable to kink.

If all of the precautions mentioned are taken they will usually prevent sun kinks unless the rail has been laid improperly with too little expansion, or rail creepage has not been controlled by the application of a sufficient number of anti-creepers. In any event, it is imperative that sun kinks be prevented, and all necessary precautions should be taken to that end.

Loose Eyebars—

Can Be Adjusted by Heating and Upsetting

LOOSE eyebars have long been a source of trouble in the maintenance of pin-connected truss bridges of early construction, and with hundreds of spans of this design continuing in service today, nearly every railroad engineering department is still experiencing difficulty in adjusting loose bars so they will assume their full load-carrying capacity.

Whenever loose eyebars are found, the basic cause can usually be traced to the fact that the spans involved have been subjected to a high rate of wear at their connections by the operation over them of heavy locomotives at relatively high speeds. This condition has often resulted in some of the members being worn until they were not carrying their share of the load, or the load for which they were designed. This, in turn, has meant that the load was being carried by other members of the span, with the result that some of the members were being overstressed, frequently requiring that the speed of traffic over the bridge be reduced.

Various expedients have been employed by different railroads to tighten loose eyebars. One of these has been the cutting out of a small section of the bars and the welding of plates or bars on both sides of the members, with a turn-buckle for take-up and adjustment. Another method has been upsetting the bars, using a charcoal stove for heating purposes. While these methods have been relatively expensive, they require that the bridge be taken out of service while repairs are being made. Furthermore, there is evidence that the first mentioned method actually weakens the bars from the standpoint of their live-load carrying capacity.

Growing concern over these facts led the Chicago, Milwaukee, St. Paul & Pacific to develop a method for repairing loose eyebars which will restore them to their full load-carrying capacity. In addition, because of its relative simplicity, this method can be employed in relatively short intervals between trains, and is said to result in substantial economies.

The method developed by the Milwaukee, which is described in an article in this issue, involves the use of heating torches, with an arrangement of plates and rods for upsetting the bars to obtain the desired reduction in length. Before the method was applied to bridge members, several laboratory tests were made to determine the effect of the heating process on the metallurgical properties of the metal and on the ultimate strength of the bars, all of which were favorable.

Since the inception of this method in 1941, the Milwaukee has carried out a program of tightening loose eyebars in its pin-connected bridges, which has resulted in more than 300 such bars being shortened in about 30 bridges.

With the prospect that railroad traffic in the months ahead will continue as heavy as, or even heavier than

that of the last few years, it is inevitable that many old pin-connected truss spans will be required to carry heavy loads, and that, in consequence, some of their eyebars will be worn loose. In view of this fact, it will be well for engineering and maintenance officers responsible for the maintenance of these structures, and not acquainted with the Milwaukee's method of repair, to study this method with the view to its use as a means of dealing with any situation that may develop.

Fewer Ties—

Shortage Due to Become Increasingly Serious

ALTHOUGH railroad maintenance of way departments have experienced increasing difficulty during the war years in obtaining adequate supplies of crossties to meet essential needs, a situation is now in the making that contains a threat of even more serious tie shortages, beginning next year, if not sooner, than have been experienced so far. The situation referred to is the further and continuing decline in crosstie production that began last fall, which has reached such proportions as to pose the possibility that railroad maintenance departments may soon be confronted with the most serious problem involving materials that they have had to cope with yet.

Ever since the United States entered the war, most railroads have had difficulty in making all the tie renewals that they have considered necessary to maintain the integrity of their tracks. Broadly speaking, there are two factors involved in this situation.

One has been the decline in tie production that occurred because of government pricing policies, combined with man-power shortages and other related factors, and the other has been the shortage of track labor to make tie renewals. Frequently, the second of these has been the limiting factor, that is, the roads have not been able to obtain sufficient labor to insert even the reduced numbers of ties that they were getting. In fact, in 1944 the roads were generally able to obtain as many ties as it was possible for them to insert, although there were, of course, individual roads on which tie renewals were limited by their inability to obtain as many as could be installed.

If the present trend continues, there is little question but that, to an increasing extent during the coming months, and certainly next year, it will be a shortage of crossties, and not limited man-power on the railroads, that will be the determining factor in making tie renewals. One estimate is that, unless the situation improves to an important extent, the total production of crossties in 1945 will be less than 60 per cent of the annual average of the last four years.

Thoroughly alarmed over the serious implications inherent in this situation, and recognizing that a shortage of labor in the woods is the present basic cause of the difficulty, the O.D.T., in co-operation with other government agencies, has initiated a program to recruit more workers to produce railroad ties. Evidence that the seriousness of the situation has at last also been recognized by the WPB is reflected in the Board's action in according an urgency rating to tie production.

Such action as is now being taken by government agencies to increase tie production is to be commended and encouraged by every means possible, but it must be recognized as being much in the nature of locking the barn after the horse has been stolen, because, regardless of how successful these efforts are, they have come too late to prevent a serious tie shortage. Not being in a position to do much about tie production themselves, the railroads will have to spread their ties as far as they will go. In any event, they must begin to make plans now to cope with the real pinch coming next year.

Official Commendation for the Railroads

and Railway Engineering and Maintenance

THE WHITE HOUSE
WASHINGTON

June 7, 1945

Dear Colonel Johnson:

The transportation facilities of the nation are now called upon for the most gigantic task in all the history of transportation. The American armies must be moved from the victorious battlefields of Europe to meet and wipe out the tyranny of the East. In order to do this job most of our soldiers will be transported the full length of the American continent.

It required every transportation ingenuity to assemble our armies in Europe over a period of four years. This time the job is to be done in ten months. The contemplation of this task would overtax our faith if we had not found during the course of this war that the impossible has become our daily job.

I am asking you to extend my congratulations to all of our transportation agencies--and their millions of workers--on the results they have accomplished. At the same time express my confidence in them for the greater effort that lies ahead.

Sincerely yours,

Harry Truman

Honorable J. M. Johnson
Director
Office of Defense Transportation
Washington 25, D. C.

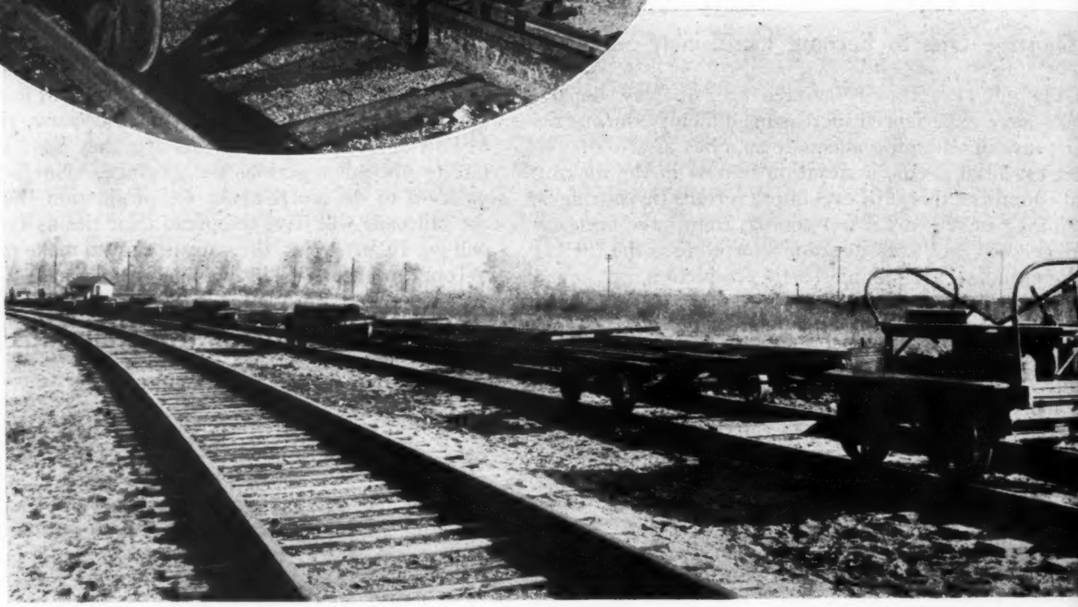
For DISTINGUISHED SERVICE in war transportation I, as directed by the President, present this to RAILWAY ENGINEERING AND MAINTENANCE with my congratulations.

J M Johnson
Director
Office of Defense Transportation

This Letter from President Truman to J. M. Johnson, Director, O.D.T., Praising the Railroads, Was Sent to *Railway Engineering and Maintenance* by Mr. Johnson with an Endorsement Added for "Distinguished Service" Rendered by This Publication.

Transports

Left—This View of One of the Push Cars Shows the Arrangement of Hangers and Ties Used to Support the Rail. Below—The Motor Car Train as Loaded at the Stock Pile Ready for Movement to the Bridge



WHEN relaying about three-quarters of a mile of double track over its Illinois River Bridge recently with continuous butt-welded rail, the Peoria & Pekin Union transported the long rails from the welding site to the bridge slung under a train of motor and push cars, minimizing the handling of the rails, reducing the labor that would have been required otherwise, and precluding the use of work train service. In this work, rails up to 607 ft. in length were transported for distances up to a mile, without mishap or difficulty, and the actual handling of the rail was greatly simplified over loading it on railway cars. All of the new rail was of 90-lb. section, replacing rail of the same weight, and all welds were oxy-acetylene pressure-welded by the "Oxweld" Automatic Rail Welding Process.

The bridge involved, which is 1,090 ft. long and which includes a bascule span, is located at Peoria, Ill., connecting Peoria to East Peoria. At this point, it plays an important part in the Peoria & Pekin Union's service of a large number of war industries, and is also used by several other railroads entering these terminals. As a result, traffic across the bridge is especially heavy, and since river traffic at this location is also extremely heavy and of such a nature that it could not be delayed, it was necessary that the rail be laid quickly and with as little delay as possible to either type of traffic.

Method Used

To cope with this situation, a method was devised for transporting the rails from the welding location to the point of installation, utilizing an arrangement of push cars equipped with hangers for supporting the rails during transit, with a motor car at each end to furnish the motive power. By using this arrangement, it was possible to transport the long rails, varying in length from 43 ft. to 607 ft., with a maximum force of eight men.

Welding was done along a side track about a mile from the bridge, at a point where the grade is approximately level, and where the rails could be conveniently welded and then stored in a pile awaiting their installation. At this location the rails were welded into 700-ft. sections and were then cut into shorter lengths corresponding to the distance between insulated joints in the track and expansion joints on the bridge. They were then marked for future identification and stored pending their installation in track.

To expedite handling of the rails from the stock pile to the loading track, several skids, made of old rails, were provided. As one of the long rails was required, it was slid down the skids to the side of the loading track, where it was barred over the running rail to the center of the track, in position for loading. The push cars were then moved forward over the rail and spaced at intervals of approximately 40 ft., this spacing being just sufficient to prevent the sag of the rail from hitting frogs, guard rails and switches while the rail was en route to the point of installation.

To support the rail during this movement, each push car was equipped with two crossties extending lengthwise of the deck and overhang-

Long Welded Rail by Motor-Car and Push-Car Train

Faced with a shortage of labor in laying a section of continuous welded rail, the Peoria and Pekin Union devised a method of transporting the rail from the welding station to the point of installation, slung beneath a series of push cars powered by two motor cars. This method eliminated work train service and considerable handling of the rail, and permitted the work to be done by a small force of men.

ing the ends of the car. These supported two U-shaped steel hangers, one at each end of the car, which, in turn, held the rail in an upright position with the rail head slightly below the axles of the car. At the tops of the ties, the arms of the hanger were bent outward and across the ties, and then downward over the outside edge of each tie to form a hook. In addition, a strut, which was bolted in position, connected the two arms of the hanger on top of the ties, holding them apart. This arrangement stiffened the hangers and prevented them from bending and slipping off the ties when the rail was hung in place.

Above — Showing the Train on the Bridge Before the Rail Was Unloaded. Right—Illustrating the Unloading Operation Being Performed at One of the Push Cars

Loading the Rail

To sling the rail beneath each push car, it was first necessary to jack it up about six inches at each end of each car. The two hangers, with their connecting strut removed in each case, were then slipped under the rail, after which the struts were bolted in place. Following this, the hanger arms were placed in position across the tops of the ties and the jacks were removed simultaneously. This process was performed quickly and easily at each push car for the entire length of the rail, except at the ends. At each end, the rail was supported directly on a small dolly consisting of a framework of short lengths of channels mounted on four flanged wheels. Rail anchors fastened to the rail on each side of the rear axles of the dollies held the rail in place and prevented it from moving backward or forward on the dollies while being transported.

Powered by Motor Cars

Motive power for moving the rail was supplied by a heavy-duty motor car attached directly to the front dolly by means of a steel rod drawbar, while

This Road Shortens

Growing concern over the number of loose eyebars in pin-connected truss bridges of early construction prompted the Milwaukee Road to devise a method of repair which could be used to restore these members to their full carrying capacity. The method developed involves the use of heating torches and an arrangement of plates and rods for upsetting the bars. This article contains a description of that method, its application and the results which have been obtained through its use.

Above — A Clamp in Position On a Bar Just Prior to Heating It. Right—Both Sides of the Bar Should Be Heated Simultaneously, Advancing the Heat Progressively in the Same Direction

TO OVERCOME objections prevalent in former methods of tightening loose eyebars in pin-connected truss bridges of early construction, a problem which has been a constant source of trouble in the maintenance of bridges of this type on most roads, the Chicago, Milwaukee, St. Paul & Pacific devised, and has been using successfully since 1941, a method for shortening these members by heating and upsetting, which restores them to their full load-carrying capacity. The method involves the use of heating torches, with an arrangement of plates and rods for upsetting the bars and tightening them the desired amount.

That the eyebars of many old pin-connected bridges require tightening is due to the fact that many of these spans, erected in the Nineteenth and early Twentieth centuries, have been overloaded by the operation over them of heavy locomotives at high speeds. In fact, many of these old structures have become so loosened through wear that many of their members, especially their eyebars, have been known to rattle for several minutes after the passage of a train. In other instances, when one diagonal bar in a panel remained tight under dead load, the other bar has been known to bow out as much as 8 to 10 in. from its true position. In the latter case, when a locomotive passed over the span, the loose bar would be drawn taut, only to spring back to near its original position as the locomotive left the span.

Program on Milwaukee

Cognizant of these facts, the Milwaukee undertook a program of tightening the loose eyebars in spans of this type on its system, which, to date, has resulted in the repair of approximately 300 such bars in simple spans ranging from 130 ft. to 250 ft. in length, and in swing spans up to 360 ft. in length. The members which have been adjusted include both main diagonals and counters, with a maximum cross section of 8 in. by 1¾ in. The maximum amount that any bar has been shortened is 1¼ in.

Several methods have been employed in the past by different railroads to tighten loose eyebars in their respective bridges, among which, probably the most common has been to cut the bars and to weld or rivet plates or bars on both sides, with turnbuckles between them for take-up and adjustment. This method is expensive, requires taking the bridge out of service and involves considerable time to make the repairs before train operation can be resumed. The principal objection to this method, however, is that the full original strength of the eyebars cannot be developed. This fact has been shown by a series of tests carried out on specimens of eyebars at the University of Illinois.

Test Results

These tests demonstrated that, regardless of how carefully each construction step is made, the splice bars will not develop more than 80 per cent

Eyebars With Heat

By A. B. CHAPMAN
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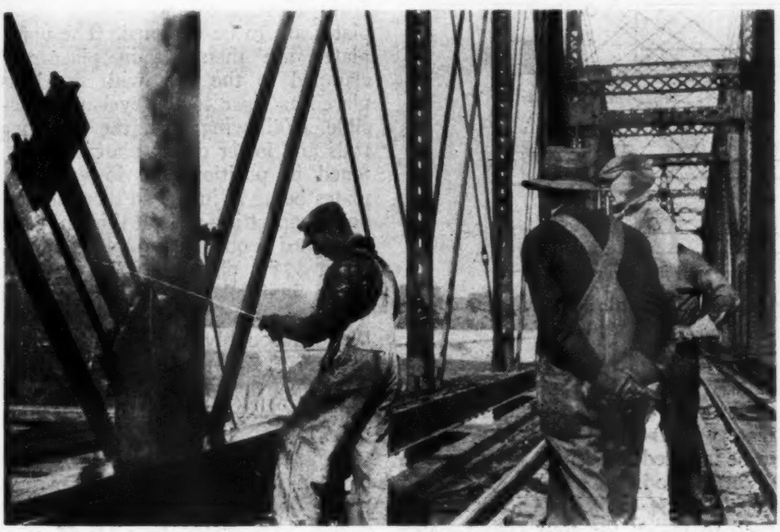
of the fatigue strength of the original section of the eyebars, and that most of them will not develop a strength approaching this amount. This means that such splices can be made to carry 100 per cent of the static load, but that where railroad live loadings are involved, failure may be expected unless the resulting live load stress in the bar is relatively low. This method



Accelerating the Cooling of the Bar After Shortening by Spraying It With Water

of tightening eyebars, among others, was used by the Milwaukee prior to the development of its present method.

The idea of tightening loose eyebars by heating and upsetting them was conceived through the use of torches to straighten members composed of one or more flat bars, which were badly bent out of position. To straighten a flat bar, it was heated on both sides simultaneously in a triangular shaped area, with the base of the triangle extending 4 to 5 in. along the convex side of the bar and converging to its apex about ¾ in. from the concave side. When heated, the bar bent still more, but when it cooled, and was again reheated and cooled, it was drawn to a straight position. From this experience, it was concluded that if a bar could be straightened by heating and shortening one side, it could be shortened in length in a similar manner.

Laboratory Experiments

Before applying this method to bridge members a number of laboratory experiments were made to determine the effect of the heat employed in the shortening process on the metallurgical properties of the metal and the ultimate strength of the bars shortened. The experiments were as follows: One end of a mild steel bar, 4 in. by ⅜ in. by 3 ft. long, was clamped in a vise in a horizontal position. The bar was then heated to a red heat, about 1500 to 1600 deg. F., on each side for a length of 12 in. At this temperature the bar showed an elongation of ⅛ in., and, when it finally cooled to room temperature, it was ⅛ in. shorter than its original length. Furthermore, the width of the bar had decreased 1/16 in., to 3-15/16 in., and its thickness had increased to approximately 13/32 in.—changes which were readily discernible to the eye. Several bars were heated in a similar manner with the same result.

The test bars were then tested for ultimate strength, with the result that every bar failed outside the heated portion. In each case the stress value at failure was found to be as great as, or greater than, that of an unheated and unshortened bar. Some of the shortened bars were then sawed longitudinally through the heated area and adjacent untreated portions, and polished. A microscopic examination of these specimens revealed that a finer grain structure existed progressively from the unheated portion to the heated portion of the bar.

From these and other investigations it became conclusively evident that mild steel, such as is used in bridge construction, will not be damaged by heating if the heating is carried out evenly and the ensuing forced cooling is not applied while the bar temperature remains between 600 and 1200 deg. F. In the case of wrought-iron bars, a number of which were heated and tested, it was found that blisters containing slag pockets were formed in nearly every heat. These bars subsequently proved to be a poor grade of wrought iron.

Fatigue Strength

Since fatigue strength is of such great importance in railroad bridges, Professor W. M. Wilson, research professor of structural engineering of the University of Illinois, was asked to investigate this matter. As a result, under the direction of the Committee on Iron and Steel Structures of the American Railway Engineering Association, arrangements have been made to conduct additional tests to determine whether steel bars which have been shortened by the heating process described will fail at a lower number of applications of stress than similar bars which have not been so shortened.

Professor Wilson has recently completed fatigue tests on some wrought iron bars which had been shortened by the heating process and subsequently removed from an old bridge on the Milwaukee, and the results showed no reduction in the fatigue strength of the bars. The bars in these tests were a good grade of wrought iron. In addition, Professor Wilson is being furnished sections of steel bars by the Pennsylvania, some of which have been shortened about ½ in. by the heating method, while other sections of the same bar have not been

This Operator Is Using an Uninsulated Electrode Holder and the Cables Coiled Carelessly Might Trip Him When He Rises

Some *Safety*

This article describes the hazards involved and the safety practices that should be observed in arc welding work. It also explains that, contrary to popular belief, arc welding is not a hazardous occupation, if the work is done in accordance with sound safety rules.

ARC welding is the only widely practiced industrial occupation in which the operator handles a live electric circuit all day. Yet, in spite of all the implications of that fact, the danger of electric shock to the operator is not as great as is often supposed. In addition to electrical hazards, arc welding involves some fire risks as well as the ordinary mechanical hazards to the workman that are common to almost any industrial occupation. The presence of fumes and smoke is likewise not peculiar to the arc-welding process, and ordinary means of dilution and removal are employed. The medical aspects of this matter are the subject of careful investigations and point to adequate ventilation as the practical hazard-preventative measure.

Wave Radiation

Radiation of ultra-violet and infrared wave lengths from the arc are sometimes regarded as serious hazards. They are not, in the sense that their effects can easily be prevented by commonly-used protective helmets and clothing. Mystery rays are not present, although it is surprising how many times the rumor crops up that this or that arc-welding equipment gives off radiations which result in sterility or peculiar ailments such as might be attributed to X-rays. Such rumors have been disposed of effectively by having welding operators carry in their clothing pieces of photographic film for weeks at a time. None show the slightest evidence of radiation.

Electric Shock

The hazard of electric shock is the one of greatest interest in arc welding. It is not as common a source of injury or death as might be supposed from casual acquaintance with the subject, and there are definite ways in which even this small hazard can be almost completely overcome. It is difficult to compile records of shock casualties, because insurance statistics are not broken down sufficiently to reveal the needed data. Also, rumors and newspaper publicity are notably inaccurate when dealing with deaths in the arc-welding field.

Some concrete information is available, and it shows a perhaps surprisingly small number of fatalities from this source. One insurance company reported that among one group of policyholders, electric shock was the least frequent cause of occupational death classified—fewer deaths being attributed to shock than to falls, machinery, railroads, or even drowning. This, in spite of the fact that the group must have included electricians and workers in electrical manufacturing plants, and in spite of the often evidenced tendency to attribute death to electrocution in any doubtful case where a live electrical conductor is present.

While figures on the total employment of arc welding operators are not available, a conservative estimate based on sales of arc-welding equipment and on the consumption of electrodes gives a figure of well over 200,000 for the year 1943, and available records indicate only four electrocutions among arc-welding operators occurred during that entire year.

An accompanying illustration shows atomic hydrogen arc-welding equipment in operation, and brings up the perpetual question of the relative hazard in a.c. and d.c. welding. Here there is at times a potential of 300 volts between the two slender electrodes projecting up and to the left from the arc. It is alternating-current. No case of severe shock, and no fatalities resulting from the use of this equipment have ever come to our attention.

Shock Hazards

The point is made to demonstrate the fallacy of arguments, based on clinical or laboratory experience, as to the difference between a.c. and d.c. with respect to shock hazards. In this equipment an adequately insulated electrode holder is used, and factory designed and built protective equipment disconnects the power when the arc is not actually in operation.

Exhaustive studies on let-go currents, made at the University of California, prove definitely that under laboratory conditions a victim is less likely to freeze onto an electrode with d.c. than with a.c. at a given current in milliamperes. But to draw

Factors in Arc Welding

By R. F. WYER
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the conclusion that d.c. welding is invariably safer than a.c. welding is to ignore the factors of voltage, insulation, protective equipment, skin resistance, and the physical condition of the operator.

The extremes to which interpretations of these tests may go is indicated by the performance of a welding supervisor, who knelt in water on a steel deck and grasped an electrode with soaking wet gloves, to demonstrate that one can feel 35 volts, but not 10 or 12. If such a demonstration ever convinces a welding operator that it is safe to place the body intentionally across any electrical circuit, it may well be a contributing factor to his untimely death.

Insulation

Most welding sets receive power at voltages from 220 to 550, but the welding circuit on all properly designed machines, which may develop 50 to 100 volts, is effectively separated from the power circuit by insulation in the machine or transformer. Some a. c. welders have a built-in control panel which automatically reduces the voltage on the welding circuit to about 30 volts within one-fifteenth of a second after the welding arc is extinguished, as when the electrode must be changed. Touching the electrode to the work automatically puts full power on the welding circuit again.

The major safety point in the installation of arc-welding equipment is the necessity of grounding the frame of the welding set, whether it is an a. c. or d. c. unit, or whether it is stationary or portable. Common sense, as well as the National Electrical Code, demand that this should be done. An ungrounded unit, even one in perfect condition, can give annoying shocks and tickles to a grounded individual, because of the inherent ability of an electrical circuit to induce a static charge on another conductor separated from it by insulation. The effect is the same as that in a condenser, or Leyden jar.

In the event of failure of the insulation, due to age, abuse, or accident, the frame of a unit may become charged to full power circuit voltage, with serious consequences, unless the frame is grounded. If the proper ground connection is in place, however, the frame cannot have a voltage to ground, and the only effect of such a failure will be the blowing of fuses or tripping of circuit breakers and disconnection of the unit from the line.

This immediately suggests the necessity of installing adequate overcurrent protection and switches in the power circuit to the welder. Fuses or circuit breakers must be capable of interrupting the maximum current which may be drawn by a short circuit in the motor or power leads of a d. c. welder, or in the primary circuit of an a. c. welder. Disconnecting switches must be capable of interrupting the stalled rotor current of the d. c. machine, or the maximum current which can be drawn by the a. c. unit when the welding electrode is short-circuited on the work.

Avoiding Double Voltage

On the welding-circuit side of a unit, care should be taken to avoid the possibility of getting double the normal circuit voltage between two adjacent welding circuits, because of the connection of one unit with one

Arc-Welding Operators Should Be Particularly Careful When Working Above the Floor or Ground, Since Many Fatalities Are Caused by Falling

The Insulation of This Electrode Holder Is Broken

evidence that uninsulated electrode holders contributed to the death.

Maintenance and supervision play an important part in the safety of welding, as is the case in almost any other process. Fire hazards should obviously be watched for and, when found, eliminated. Welding cables and their connectors should be examined frequently for breaks in insulation. The extremely hard service to which welding cables are subjected often results in severe damage to the insulation. Yet the welding operator, accustomed to arcs and sparks in his daily work, often disregards accidental short circuits which spell trouble to the safety man or the fire inspector. Likewise, welding return-circuit connections should be given attention. Arcs or flashes in unexpected places along the return path of the welding current may result in fire hazards if indiscriminate use is made of returns consisting of building piping, reinforcing rods, scrap lengths of pipe, or bars.

polarity, and the other with opposite polarity. On a. c. units, abnormal voltage of somewhat lower value can also be obtained if adjacent welders are operated from different phases of the supply line. This factor has rarely, if ever, caused serious trouble because of the small likelihood that an operator will get hold of two welding circuits at once.

Probably the most important item in equipment, from the safety point of view, is the electrode holder. Although uninsulated holders have been used in arc welding for many years, good practice unquestionably requires that fully insulated holders should be used.

Cramped Positions

One of the accompanying illustrations not only shows an uninsulated electrode holder but, incidentally, an ideal set-up for potential trouble. The operator is in a cramped space, and also undoubtedly in contact with the conducting metal at a number of places on his body, unless his clothing is dry and his shoes are free from nails. In his hand he holds an electrode holder which has a handle of insulating material, but through which extends an uninsulated screwhead. Probably any contact he might make with the screw, through wet gloves or with the bare hand, would be too small in area to cause electrocution. But the shock received might cause him to do something involuntarily, which will put him in danger. The worst feature of this holder is that the head, projecting out beyond the ring or collar of insulating material just above the hand, is entirely uninsulated. Each time the operator changes welding electrodes, there is a good chance that he will contact this exposed metal. If he should fall on the holder, or sling the cable over his shoulder or around his neck, as is frequently done, this live conductor may contact his chest or back.

There are now several types of good insulated electrode holders on the market. They should be used on every welding job, and their insulation should be kept in first-class condition. Studies of accident reports reveal, in a good percentage of cases,

The Electrode Holder Should Never Be Thrown or Placed Where It Can Make Contact With Conducting Material

Ground Connections

The maintenance of adequate safety ground connections to the frames of all welding machines should be checked, because many operators do not realize their importance. For the same reason, the maintenance of insulation on electrode holders should not be left to the discretion of operators alone. Electrical repairs and connections on the power-line side of the welder should be handled only by competent men. In the last analysis, it is obvious that the welding operator and

his safety education plays the greatest part in preventing accidents.

The paramount warning should be to take particular care in hot and humid weather, and when welding in wet places. Almost without exception, fatal accidents to welders occur in hot weather. The operator's own condition and that of his clothing should be his guide. He should always guard against wet gloves, shoes and clothing, particularly clothing made of thin cotton fabrics.

Operator's Responsibility

The operator should assume the major responsibility for seeing that the insulation of the electrode holder is in good condition.

He should learn to carry an electrode holder by the handle; never slung over his shoulder, or squeezed under his arm.

He should never, under any circumstances, transport an electrode holder with an electrode or electrode stub in it.

He should never throw or lay an electrode holder down so that it makes contact with any conducting material.

He should never work alone in confined or concealed places, where, for example, striking his head may cause temporary loss of his faculties.

He should be particularly careful when working above the ground or floor, since it is significant that many fatalities involve a fall.

Case studies, incomplete as they usually are, give a basis for these recommendations. For example, in all but one of nine reports of accidents, dating from 1934 to 1943, the statement was made that the weather was very hot, or that the victim's clothing was soaking wet. In five of these nine cases, a fall was involved, ranging from a height of 11 ft. to the case of a standing man who fell to a steel floor. In every one of them, the electrode holder was uninsulated, and in none was there evidence of contact with any live part other than the electrode holder. Four of the cases involved arc-welding operators working in confined spaces.

Summary

This discussion can be summarized as follows: (1)—Arc welding is not a hazardous occupation, as judged by industrial standards; (2)—Electric shock is a relatively infrequent cause of death. Where electrocution of the welding operator has occurred, one or more of three factors was usually involved: (1) an uninsulated holder; (2) wet gloves and clothing; and (3) a fall.

Diesel Sheds

(Continued from page 665)

mediate trusses have knee braces extending from the columns to the midpoints of the top chords. The purlins generally consist of channels or I-beams.

The posts, girts, roof trusses and purlins of the building frames were fabricated by oxy-acetylene welding from scrap or second-hand steel, at the company's reclamation plant at Silvis, Ill. In designing the trusses, the welds and stress computations were based on current specifications of the American Welding Society. After fabrication, the framework of each of the buildings was assembled at the plant to check the construction fit. The frame was then dismantled and loaded for shipment in one car, together with all the other materials required for the particular building. When erecting the buildings, the posts were bolted to the foundation, and the principal members of the frame were assembled by bolting.

Siding and Roof

The corrugated-Transite covering for the side walls and roof of each building was fastened to the girts, caps and roof purlins with ¼-in. lead-headed bolts and clips of several types which slip over the ends of the bolts and are fastened to the various members of the building frame. Two to three rows of bolts and clips were used to secure each sheet of Transite. The ridge of the roof is covered by a Transite ridge roll.

The engine door opening provided at one end of each building is 13 ft. 8 in. wide by 16 ft. high and is equipped with double-hinged frame doors covered with diagonal wood sheathing. For the use of personnel in entering or leaving the building without the necessity of opening the large doors, one of the doors is provided with a small wicket door. The buildings are kept warm in winter by radiant heat from a semi-automatic magazine-feed stove, of 100 or 200-lb. capacity, which is fired from the exterior by access through a metal door in the side of the building. Inside the building the stove is partitioned off by a metal grille, eliminating the necessity of entering the room where the locomotive is housed.

In some cases, where there was a possibility that the Diesel shed might be relocated soon, a foundation of second-hand timber, instead of concrete, was installed. In those buildings that have an engine pit, the rails are supported on the concrete pit walls with clips and bolts set in the concrete, and in all the buildings stop blocks are bolted to the rails at the ends of the tracks.

The design and construction of these buildings was carried out under the direction of the engineering department of the Rock Island. At two of the locations the construction work was performed by the local division bridge and building forces, and at the other two locations it was done under contract.

Shortening Eyebars

(Continued from page 669)

298-300. The formula is as follows:

$$N=1107\frac{i}{L}\left(\sqrt{T}+3162\frac{t}{L}\right)$$

Where N=Number of complete oscillations in 60 sec.

i=Number of loops in vibrating bar (for eyebars shaken as described above, i=1.)

L=Length of bar, inches

T=Unit stress in bar, pounds per square inch

t=Thickness of bar, inches.

Some investigators maintain that the dead load stresses cannot be determined closely by this formula, due to the way the bars bear on the pins. Even though this may be true, it does give a good measure of the tightness of adjacent bars in the same panel.

As far as is known, the Milwaukee was the first railroad to use the method described of shortening eyebars by heating with torches and upsetting. Some years ago, the Burlington used charcoal heaters for shortening such bars, but this method has not been in use in recent years.

This Poster, No. 262, Constitutes the July Installment of the "All the Year—Every Year Safety Program" of the Safety Section, Association of American Railroads

Number 3 of a Series

This installment of the series on the selection, care and operation of track motor cars consists of two parts, the first of which, presented herewith, deals with motor-car frames, wheels, axles and insulation. The requirements of these various parts are discussed and the different types of construction are described in some detail. Part II of this installment, to be published in the September issue, will give consideration to axle bearings, brakes and other features.

How a Motor Car

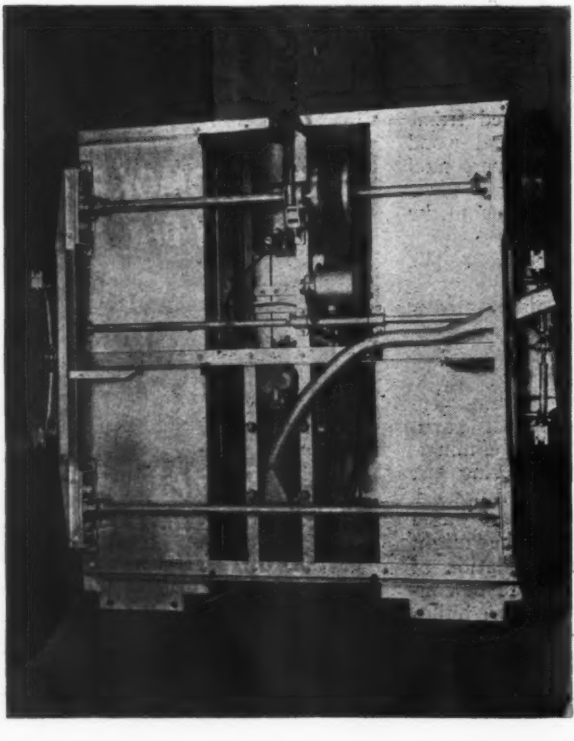
By G. R. WESTCOTT
Assistant Engineer, Missouri Pacific Lines
St. Louis, Mo.

ROADWAY motor cars are much alike in appearance. They vary in size, but, with the exception of the party inspection cars, are built along much the same lines. To the casual observer such cars comprise a frame carried on two sets of wheels and axles; a seat deck, about 16 in. above the frame and occupying one-third to one-half the width of the car, under one end of which is the engine and on which are mounted the controls; tool trays on either side of the seat deck and immediately above the frame; brake toggles and brakes outside of the frame and between the wheels on each side; and a safety rail at each end of the car. Except on the smallest cars, the frame is usually longer than the wheel base and, therefore, overhangs the axle at each end. This general design may be modified for specific uses, but the large majority of the cars in work service adhere closely to the general pattern, and many of its characteristics are also found in some of the smaller party inspection cars.

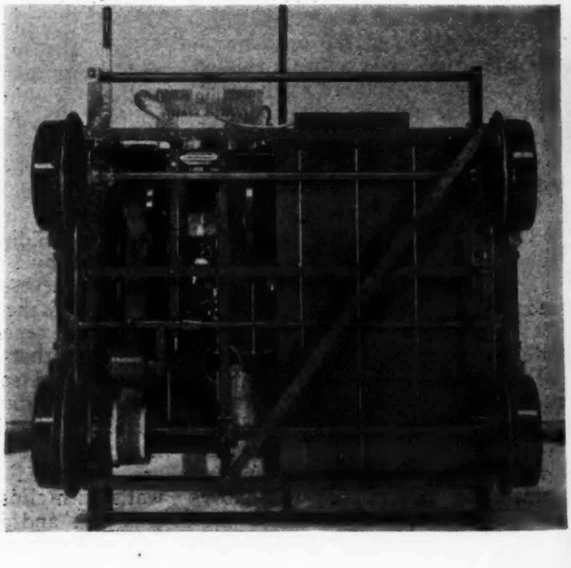
A detailed examination of the cars, however, discloses a wide variation in methods of construction and in the materials used. Frames are of various materials and designs, power plants vary greatly in size and type, transmissions are of several different designs, wheels of several sizes and types and throughout each car will be found characteristics that reflect the ingenuity of the builder. Many parts are involved in the construction of each car, and it is not the purpose here to discuss all of these parts in detail. There are, however, many features that have a direct bearing on the usefulness, the safety, and the durability of the car. The discussion of these features will not only point out to some extent the practices of the motor car builders in the design and construction of these cars, but will also give some of the underlying reasons why certain types of construction have met, to a greater degree than others, the requirements of those who use the cars.

The Frame

The frame is a most important part of the motor car. It must be flexible enough to permit all wheels to remain on the track even though the track surface is uneven, as may occur, especially at turnouts, and to withstand the vibration to which it is subjected without damage to itself; at the same time it must be sufficiently rigid to hold each part in its proper relation to the other parts. It must be strong enough to carry its load. Frame weakness may often be the cause of undue wear on wheels, misalinement of belts or chains, and rough or unsafe riding qualities of the car. The materials of which it is made must be well selected, and its design must be given careful

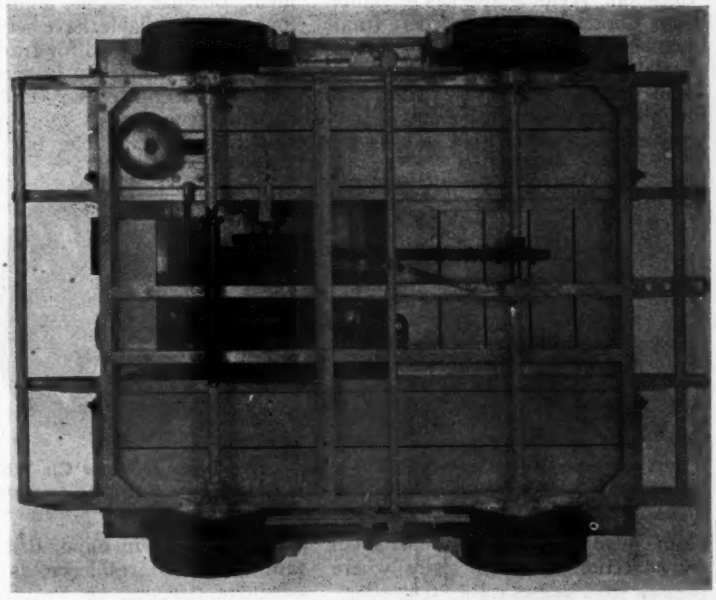


Left—The Frame Members of This Inspection Motor Car Are of Aluminum Alloy. Below—Side Load Inspection Motor Car With a Wood Frame



Is Built

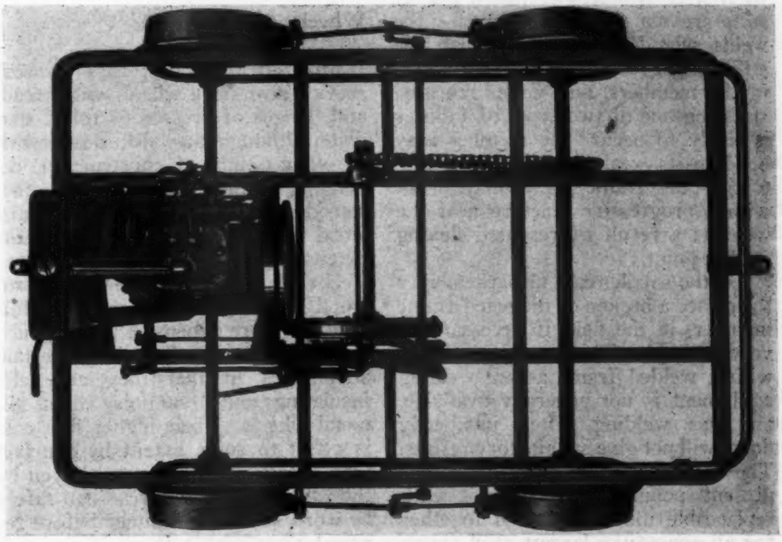
Part I



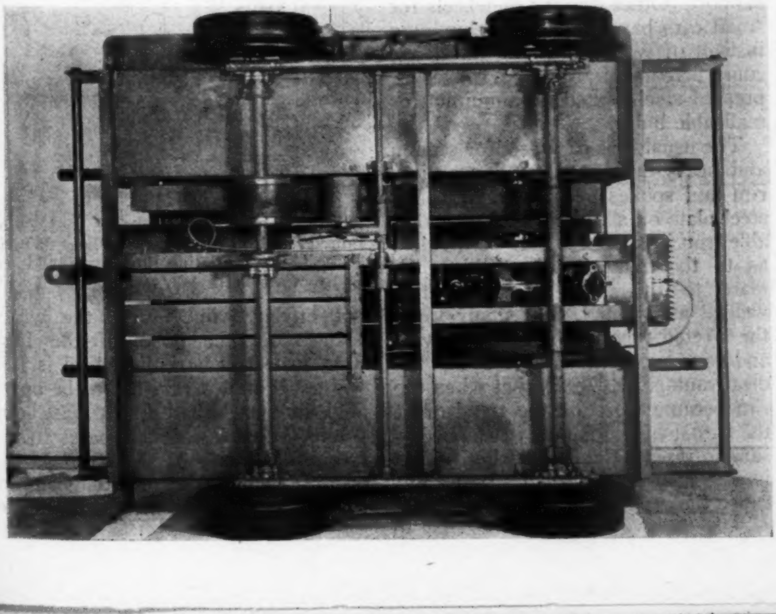
and intelligent thought if full life is to be secured from the car.

In the earlier motor cars, the frames were usually of wooden members bolted together. The design followed closely that used previously for the frames of hand and push cars, with suitable additional members to support the engine. The wood frame has much to recommend it; it also has many disadvantages. It is comparatively light and sufficiently flexible that the light shocks incident to the handling of the car are commonly resisted without damage. Furthermore, if a member fails, a new one can be made and installed readily.

Wood, however, is subject to shrinking and swelling with changing atmospheric conditions, and for that reason it is difficult to keep the frame bolts tight, and if they are not tight the frame is weakened. If wood frames are used, the timber, usually of oak or maple, should be of good quality and well seasoned. Bolts with rolled threads, as commonly made, are not suitable for frame construction as the thread is of larger diameter than the shank, and if the bolt hole is bored



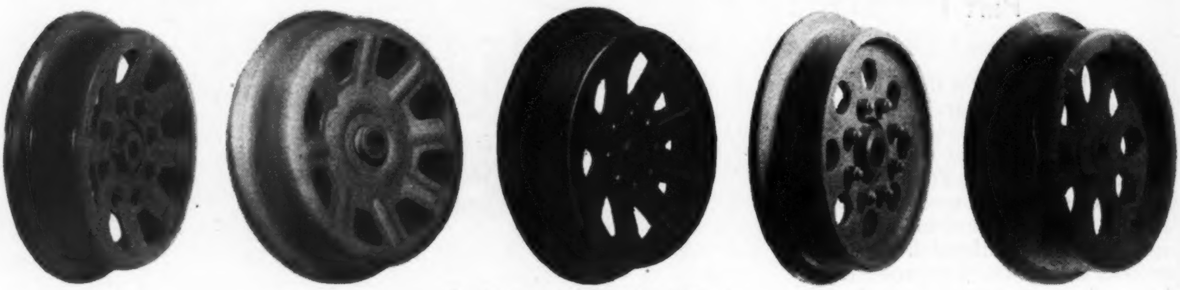
Top—Standard Section Motor Car With an All-Steel Frame—Bolted Construction. Right—This Frame, for a Section and Extra Gang Car, Is of Structural Steel Welded at All Joints. Below—Frame of a Standard Section Car Having Alloy Steel Axle Bearing Sills and Other Members of Steel



large enough to admit the threaded end, the shank of the bolt will fit loosely in the hole. The bolts, therefore, should have cut threads or, if they are rolled, they should be made by the extruding process by which uniform diameter is secured throughout the length of the bolt. Grip washers under the bolt heads and double nutting of the bolts assist in keeping them tight.

The material most generally used for frames at present is steel, either in the form of specially-shaped pressed steel members or of small structural steel shapes. Riveting, welding and bolting have been used to connect the steel members, although riveting should now be considered obsolete for this purpose, for the rivets will come loose under continual

vibration. Welding also has its limitations. On the largest cars where frame members are of structural shapes and fairly heavy sections, electric welds have proved satisfactory when well designed and expertly made. However, on section and smaller cars, the men. Because of this, aluminum alloys, when available, have been largely and successfully used for frame members on one-man, light inspection and some light section cars. After the present emergency passes, other materials may also be available, but it must was a difficult field job, requiring renewal of the insulation and regaging of the wheels, the bolted or demountable type has come into favor to such an extent that the A.R.E.A. has adopted a recommended design which will permit interchangeability of



Five Types of Motor Car Wheels

Left to Right: A.R.E.A. Type Demountable Wheel (16 In. or 20 In.); Pressed Steel Welded Wheel (16 In.); Riveted Wheel (16 In. or 20 In.); Heavy-Duty Demountable Wheel With Tire and Spoke Section of Cast Steel; Wood Center Wheel (14 In.)

frame members of which are of small cross section, and especially where pressed steel shapes rather than structural steel members are used, the results are not so satisfactory, for the welds introduce areas in which the stiffness is greater than at other points in the members, and under repeated stressing one of two types of failures is likely to occur; the member may bend in its weaker section, thus distorting the frame, or it may break with a progressive fracture near the weld as a result of repeated flexing at that point.

On the smaller cars also, the ability to replace a broken or distorted frame member, in the field if necessary, is very desirable. This is not practicable with a welded frame as arc welding equipment is not generally available, and gas welding, often inexpertly done, will not give satisfactory results. These considerations have led to the present popularity of frames with replaceable members bolted together for all except the largest steel frame cars. For bolted frames, bolts with American Standard Fine (SAE) threads are less likely to loosen than bolts with American Standard Coarse threads. A practical disadvantage, however, is that replacement nuts and bolts with fine threads are less easy to secure as they are not so commonly carried in stock. The use of lock washers, lock-type nuts, or double nutting gives added safety against bolts becoming loose.

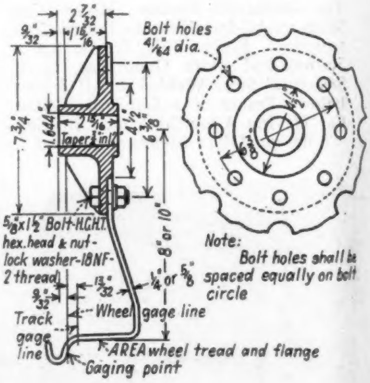
While frames of steel are very popular for standard section and heavy-duty cars, that material is not so well adapted to the construction of frames for light section and smaller cars, for it is difficult to secure adequate strength and rigidity and still keep the weight down to the requirements necessary for handling the car off and on the track by one to three always be kept in mind, that a certain amount of resilience, as well as adequate strength, are required.

Wheels

Most of the motor cars in work service now have wheels with treads and flanges of pressed or rolled steel plate, although they differ somewhat in other points of construction, depending on the type of car and other considerations. On the smaller cars, wood center wheels are used quite extensively. These, within the pressed steel rims, have spokes and felloes of wood on forged steel hubs. While they are more expensive to construct, wood center wheels possess certain advantages in that they are self-insulating and less noisy than all-metal wheels. Their higher first cost is offset to some extent by the fact that, because of the support given by the wood felloes, the tread can safely be worn somewhat thinner before renewal than where there is no such support. Other designs of wheels for small cars have centers of aluminum instead of wood, and still others are constructed with rim and spokes of pressed steel, bolted on aluminum or malleable hubs.

The usual type of wheel for section and heavy-duty cars has a one-piece rim and spokes of pressed or rolled steel plate on a forged steel or malleable iron hub. These may be divided, as to the manner of attaching the plate to the hub, among riveted, welded and bolted. For many years the riveted type was used exclusively and gave excellent service. It had the disadvantage, however, that when the rim became worn on the tread or at the throat of the flange, it was necessary to replace the entire wheel. This is true also of the welded type. Because the renewal of the entire wheel parts, regardless of the manufacturer. This design is shown on the accompanying plan.

The A.R.E.A. has also recommended a contour of tread and flange for use on all motor car wheels. Comparison of this plan with the standard A.A.R. tread and flange for car wheels shows that it conforms to the latter, except in width and slope of tread, and depth of flange. The tread is made narrower on the motor car wheel to save weight and, on ordinary tracks, the width shown is adequate for safe operation. However, in yards and terminals, where train movements are slow, self-guarded frogs are sometimes used and the flange on the self-guarded frog is



Details of the A.R.E.A. 16-In. and 20-In. Bolted and Demountable Plate Wheel, Using 1/8-In. Insulating Bushing, For Motor Cars With 1 7/16-In. Axles

not effective in guiding the wheel flange past the point of the frog unless the tread of the wheel is full width. If motor cars are to be operated in such localities, it has been found desirable in some cases to increase the width of the tread ¾ in. or more by attaching an extension rim to the outside of the wheel. While the

slope of the tread on the A.A.R. car wheel is 1 in 20, it is generally conceded that a flatter slope retards shimmying, or the tendency of the flange of one wheel and then the other to thrust against the rail. While it is possible that a cylindrical wheel tread might run truer than a wheel with coning of the tread, the 1-in-40 slope recommended is about as flat as can be manufactured readily. The increase from 1 in. to 1⅛ in. in depth of motor car wheel flange provides added protection against derailing the car, which might occur because of its short wheel base and light weight.

The wheel most commonly used on one-man cars is 14 in. in diameter, with either 3/16 in. or ¼ in. thickness of plate in the tread. The use of 3/16-in. plate should be limited to wheels having the support of a felloe under the rim, as is the case with wood or aluminum-center wheels. The 14-in. wheels are also used sometimes on light inspection cars and less often on light section cars; for such cars 16-in. wheels are most common.

For many years, wheels both 16 in. and 20 in. in diameter were used on gang cars, the 20-in. wheels being made of ¼-in. plate and the 16-in. wheels of 5/16-in. plate. At present, however, the tendency is to equip all section cars and many heavy-duty cars with 16-in. wheels and to restrict the use of 20-in. wheels to a few of the larger heavy-duty cars. Because of their greater contact with the rail in running a given distance, 16-in. wheels should be made of 5/16-in. plate unless the weight of the car is a matter of considerable importance. Also, since the use of 20-in. wheels is now limited largely to cars carrying heavy loads, it is in the interest of economy to use only 5/16-in. plate on wheels of this size.

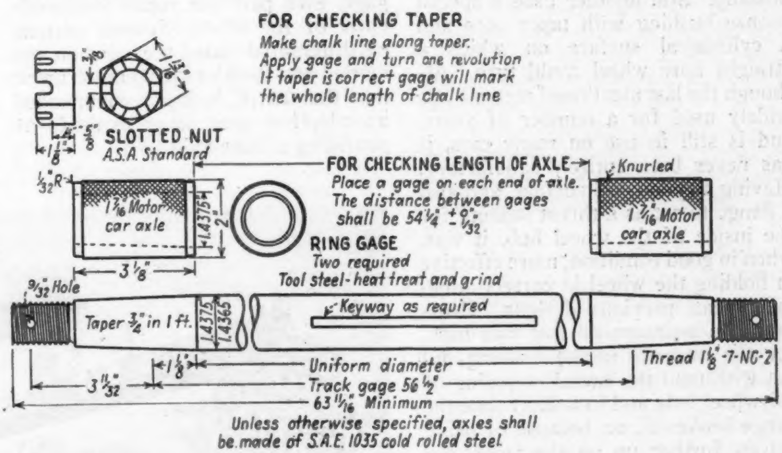
While practice varies somewhat, especially on the smaller cars, the type of wheel, its diameter, and the thickness of plate shown in the accompanying table may be considered good practice for the various classes of cars.

Motor Car Wheel Sizes and Plate Thicknesses

Class of Car	Type of Wheel	Diameter	Thickness of Plate
One-man, light inspection, or light section	Supported tread, as in wood or aluminum center wheels	14 in.	3/16 in. or ¼ in.
One-man or light inspection	Unsupported tread—tread and spokes integral	14 in.	¼ in.
Light inspection	Unsupported tread—tread and spokes integral	16 in.	¼ in.
Light section or section	Unsupported tread—tread and spokes integral	16 in.	¼ in. or 5/16 in.
Heavy duty	Unsupported tread—tread and spokes integral	16 and 20 in.	5/16 in.

For the largest heavy-duty cars, rims and spokes of cast steel are sometimes used instead of steel plate. These have a tread thickness of about ⅝ in., turned to a true circle concentric with the bore, and are bolted to the hub as with the pressed steel plate rims. Complete wheels of cast steel with turned tread, and of chilled cast iron, are also used on such cars in some cases. These heavier types of wheels are much more expensive than the pressed steel wheels and, generally, are used only on cars designed for special service. Like other features of party inspection cars, the wheels of these cars vary greatly in character and no attempt will be made to discuss them here.

On one-man and light inspection cars, wheels are sometimes used which have facings of vulcanized rubber molded and bonded to the steel treads. Such wheels eliminate much noise and possess some advantages under certain conditions of weather and rail, but under certain other conditions they have not proved very successful. The decision whether the advantages of their use outweigh the disadvantages involves a study of the conditions under which the car is to be used, and may turn on a consideration of personal choice.

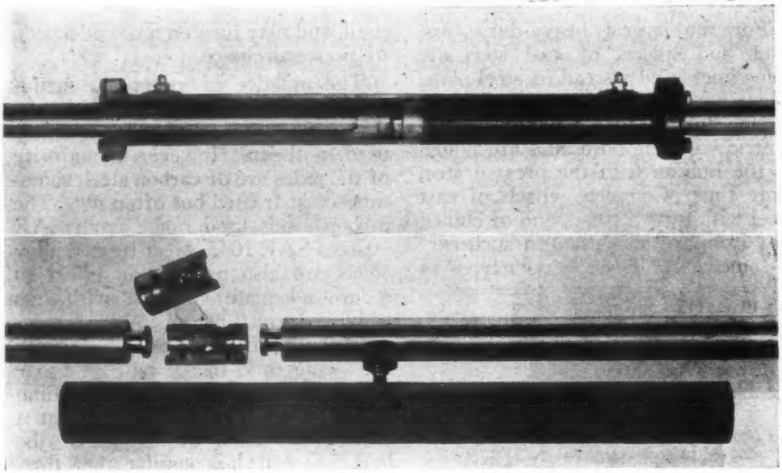


Showing Details of the A.R.E.A. 1 7/16-In. Axle and Ring Gage for Checking the Dimensions of Motor-Car Axles

The practice of motor car manufacturers varies greatly, both in the design of axles and in the materials used in them. However, a majority of the axles are of carbon steel, sometimes heat treated but often not. The carbon steels used range from SAE 1020 to SAE 1045. Heat-treated alloy steels are also used in an effort to secure adequate strength with less weight. It must be remembered, however, that stiffness as well as strength must enter into the design. The axle must withstand considerable bending stress, not only from the load that it carries but from the thrust of the brakes as well; it is possible, therefore, for an axle to have sufficient strength to avoid breaking but still fail through bending under the rather rough handling to which all cars may be subjected.

The ends of the axles are tapered to fit the taper bore in the wheel hub. Although the taper is uniformly ¾ in. in 12 in. for all axles 1-7/16 in. in diameter and larger, on axles of smaller diameter the taper is variable.

Outside the tapered portion, the end of the axle is threaded for a slotted nut, and bored for a cotter pin to prevent the nut from backing off. Where wheels must be insulated, which is now a very common requirement, an insulating fiber bushing is placed between the wheel hub and the axle, the bore of the wheel being increased to allow for the thickness of the bushing. With a correctly proportioned axle, and a proper bore of the wheel, either insulated or non-insulated, the wheels, when drawn to gage, will resist the tendency of traction to turn the axle within the wheel for axles not over 2 in. in diameter. Attempts to key insulated wheels to the axle by means of a fiber key have not been success-



Two Types of Differential Axles for Motor Cars

ful; and no simple method has yet been devised for insulating wheels on axles larger than 2 in. in diameter.

In a previous article, mention was made of the need for a loose axle in handling a car on and off the track, the purpose being to permit each wheel on that axle to rotate independently of the other. This has been accomplished in various ways. One method provided a special axle, with one cylindrical end on which a special wheel with straight bore could rotate. Another used a standard tapered end axle and permitted one wheel to rotate on the taper, with or without a bronze bushing. Still another used a special bronze bushing with taper bore and a cylindrical surface on which a straight bore wheel could turn. Although the last mentioned method was widely used for a number of years, and is still in use on many cars, it has never been entirely satisfactory. Having a cylindrical surface, and also a flange to act as a thrust bearing for the inside of the wheel hub, it was, when in good condition, more effective in holding the wheel in correct alinement than previous designs. However, the maintenance cost was high, for the material in the bushing did not withstand the lateral pounding of the wheel hub, and in a short time the flange broke off, or, because of being driven further up on the taper, the bushing expanded to the point where the wheel would no longer turn. Another device that has given satisfactory service, but which has not been used very extensively because of its higher cost, is a special wheel having a ball bearing in the hub, permitting the outer part of the wheel to turn while the inner part of the hub remains tight on the axle.

The maintenance of the loose axle or wheel has always been a problem of some importance; it was necessary, but was expensive because of the frequency with which the parts had to be renewed. Furthermore, with the exception of the design using the ball bearing wheel hub, there was no way in which the wheel could be insulated; and in nearly every case a wheel was required that was different from the other three on the car. This led to the introduction of the differential type of axle, in which the axle is in two parts, each rigidly attached to a wheel with which it turns; the two parts, however, being so connected that while the total length is held constant, thus maintaining the wheels in correct gage, each part can rotate independently of the other. Several designs of differential axles are now on the market and the idea has so much merit that the A.R.E.A. has recommended its adoption over other methods of providing a loose axle.

It might be well to note here that the joint connecting the parts of the differential axle is of somewhat greater diameter than the axle itself and on some cars will interfere with the exhaust pipe, the oil pan or some other part of the engine. However, the joint may be moved away from the point where the interference occurs by making one part of the axle longer than the other. Since the joint must be lubricated, it is desirable that it be removed far enough from the engine exhaust so that the lubrication will not be affected by the heat.

One of the desirable features of the differential axle is that it permits the insulation of all wheels. This was of less importance when frames were of wood and the use of track circuits for signaling was less common, but with metal frames, or with wood frames where the rail skids are tied in to the axle boxes, as is often done, the insulation of all wheels is necessary to assure against any possibility of signals being "thrown" by the car. It is true that when the car is on the track, the insulation of three wheels (or only two if both are on the same side of the car) will protect against throwing the signals; but in handling the car on or off the track, especially in open track, the car, when crosswise of the track, can get into such a position that the track circuit will be closed.

The track circuit may be closed also when a steel frame motor car which has only two wheels insulated is coupled to a steel frame push car or trailer that likewise has only two wheels insulated, unless all of the insulated wheels are on the same side. It is for these reasons that the A.R.E.A. recommends the insulation of all wheels on a motor car.

A Double-Track Railroad Bridge Across the Seine River Near Argenteuil, France, Under Construction by the Bridge and Building Forces of the 724th Railway Operating Battalion With the Co-operation of French Civilians

What's the ANSWER?

Cause of Black Spots on Rails

What is the cause of black spots on the running surface of rail near the gage edge? How do they develop? Can they be prevented? If so, how? If not, Why?

First Sign of Shelling

By G. M. Magee
Research Engineer, Association of American Railroads, Chicago

The black spots that develop on the running surfaces of rails near the gage edge are the first indication of shelling. They usually develop on the outer rails of curves where the bearing pressure of the wheels is concentrated on the gage edge. An internal fracture or area of metal separation develops about one-quarter inch below the surface, which is extended progressively under repeated wheel passages. The metal overlying the fracture, being no longer restrained, flows toward the gage side under the impact of wheels and becomes depressed below the level of the adjacent metal. This flowed metal thus loses contact with the majority of car wheels and becomes darkened because there are not sufficient wheel contacts to keep it polished. Eventually, the fractures will generally progress to the gage side and a shelling out of the metal will occur. Sometimes they turn downward into a transverse component, with the result that it is possible they may be mistakenly classified, when the rail is broken, as compound fissures.

The true cause of these shelley spots is not known at the present time, but extensive investigations are being made to determine their origin and to develop means for preventing their occurrence. They are considered to be fatigue failures due to repeated stressing of the rail steel beyond its endurance strength. Some have thought that the use of rail lubricators was responsible for the development of shelling. However, since the fractures start internally it is difficult to see what effect lubrication could have; it seems more probable that before lubricators were used the gage edge abraded away so quickly that the shelling did not have time to develop.

Critical examination is being made of the manufacturing process to determine if some unsuspected details may be responsible for shelling. Also, studies are being made of rail steels of different chemical compositions and heat treatment. In addition, consideration is being given to the possibility of modifying the contour of the rail head with the objective of reducing the initial heavy bearing pressure that occurs on the gage corner of the rail before it is worn to fit the wheel contour. It is hoped that these different avenues of investigation will lead to a solution of the problem of shelling, which will be as effective in preventing the development of shelly spots as controlled cooling is proving to be for the prevention of transverse fissures.

Show Fatigue of Metal

By C. B. Bronson
Inspecting Engineer, New York Central System, New York

Black spots on or near the gage corner of the rail head are direct evidence that the ductility and fatigue strength of the metal have become exhausted. Sub-surface defects, such as porosity, blow holes, slag streaks or local segregations, will materially hasten the action and appear to be responsible for it to a considerable extent.

The condition is really the incipient stage of gage-corner shelling and is largely confined to the high rails of curves, particularly on the sharper ones. Until efficient rail lubricators came into extensive use, the rails were

To Be Answered in September

1. *What constitutes improper spiking? What are the effects? How can this be overcome?*

2. *Can asbestos shingles and siding be painted? How is this done? What kind of paint? What precautions? What are the advantages?*

3. *Who should make repairs to track tools? To whom should they report? Should repaired tools be returned to the section that sent them in. or should they be held and re-issued on requisitions? Why?*

4. *When necessary to employ staging for the repair of timber trestles, are there any advantages in using iron staging hooks? Any disadvantages? Why? How can they be attached to the bridge? How adjusted for height?*

5. *Is it practicable to prebore switch ties for spikes? If so, how can the holes be located? If not, what measures can be employed to protect spike holes against decay?*

6. *What procedure should be followed when renewing one or more posts under a wooden water tank? What precautions should be observed?*

7. *Should brakes be installed on push cars and motor-car trailers? Why? What type of brake?*

8. *What is the most satisfactory method of patching concrete floors? Does the service required of the floor make any difference?*

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

worn rapidly enough to remove the fatigue metal before the black spots became serious or pronounced, thus preventing them from enlarging and deepening into the heavy shelling type. The writer has noted little of this condition on tangent track rail, although some cases of its occurrence on such rail have now been reported by various railroads.

This entire subject is now being energetically and actively studied by an excellent sub-committee of the Committee on Rail of the A.R.E.A. Liberal appropriations have been made to expedite this investigation, which is concerned primarily with shelling, but basically with black spots which are the incipient stage. It is not possible to predict yet whether this problem can be completely solved, but there are certain things that can and are being done which should be of material benefit. Among these are proposed changes in the contour of the entire rail head, but in the opinion of the writer such changes will have but a small effect for, after all, it is only a question of a rather limited time before the initial contour or shape of the rail head is worn to the general or average conditions of the wheels of equipment traversing the track.

Considerable benefit should be obtained through the use of steel of greater fatigue resistance, such, for instance, as steel containing three per cent chrome, as well as others, coupled with a higher degree of soundness in the metal as regards the presence of the different types of ingot defects. To obtain the ultimate in soundness, the use of hot-top inverted molds would be necessary. While this expedient, together with the use of alloy steel, will be costly, it will in general be necessary to purchase such steel for only a relatively small mileage of track, with the proportion of such track being highest on those roads with a high traffic density and a greater percentage of sharp curvature. The important need is confined mostly to territory incorporating relatively sharp curves.

Leveling the Right of Way

In view of the increasing use of tractor-drawn equipment, to what extent is one warranted in leveling the right-of-way to eliminate hand mowing? How much weight should be given to other factors, such as better drainage and improved appearance?

Is Well Worth While

By H. R. Clarke
Chief Engineer, Burlington Lines, Chicago

Considering all the factors involved, the leveling and smoothing of the right-of-way is well worth while, but it is rather difficult to say definitely how much weight should be given to the various advantages obtained. Under present conditions the necessary labor to mow the right-of-way cannot be spared, but even if sufficient manpower were available to use it for cutting weeds by hand this would be expensive and undesirable.

Sufficient power equipment has been developed and is rapidly coming into use for mowing grass and weeds, and the efficiency and effectiveness of such equipment can be greatly increased by undertaking such work as is necessary to make the right-of-way reasonably smooth. As such work can be done very economically with the types of off-track dirt-moving equipment now available, the comparatively slight cost of doing it will be returned in a very short time in the form of savings effected in the cost of mowing the right-of-way.

Improved drainage is another important advantage obtained through the smoothing of the right-of-way. The cleaning of ditches in cuts and the proper sloping of the ground both in cuts and on fills, so that water is kept as far as possible from the roadbed, produce decided advantages. If water is permitted to stand for a long period at the toe of a slope it is likely to result in a soft roadbed, causing slides which are expensive to restore. This condition can be eliminated or avoided by smoothing and leveling the right-of-way with an eye to achieving good drainage. We have noticed that where this work has been done there has been a decided improvement in the condition of the track, and in many cases the work required to keep the track riding well has been substantially reduced.

Improved appearance is also a factor to be considered. At the present time this is perhaps not so important, except for the influence which it may have on the morale of the maintenance forces and on the manner in which they handle their work, but, as service is improved and made more attractive following the present emergency, the matter of appearance will become more important.

The restoring of banks and the ditching of cuts have always been recognized as essential to good maintenance; with modern equipment very little additional expense is involved in doing a complete job of smoothing and leveling the right-of-way, as compared with the rather rough and somewhat incomplete way in which such work has at times been handled in the past.

Must Be Properly Done

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific Lines, Poplar Bluff, Mo.

Power-driven mowing equipment in the form of tractors is widely used and is so economical that the use of hand methods for cutting the right-of-way, except at places where the ground is extremely rough, should be seldom necessary. In fact, the leveling of the right-of-way where necessary to permit the operation of power mowing machines is justified by this one consideration. However, in my opinion, the smoothing of the right-of-way should not be done as a special job, but rather, should be given consideration when conditions require the opening up of drainage ditches or the widening of the banks on first class and primary tracks.

When carrying out this class of work the earth removed from high points on the right-of-way should be used to widen the banks, and when ditches are constructed the excavated material should be cast or otherwise moved into the low spots. The practice of digging holes at the toe of a slope to build up the banks should be discouraged. If ditches are not required to afford better drainage, the desired smoothing of the right-of-way can be done by equalizing the high and low places. The cost of doing the work in such a manner as to keep the ground level will be much less in the final analysis than to allow holes to be excavated when widening the banks. Any step that will better the drainage of the right-of-way will also improve its appearance. In carrying out the work of smoothing the right-of-way it is important that any heavy bushes growing on the property should be cut off at or below the ground level.

Four Factors Involved

By Division Engineer

Among the factors to be considered in determining the advisability of leveling the right-of-way are: (1) Improved appearance; (2) better

drainage; (3) better control over the growth of vegetation; and (4) facilitating the use of off-track equipment. The character of the track and traffic is, or should be, an important factor in determining the desirability of improving the appearance of the right-of-way. Where the line carries an important amount of passenger traffic, the cleanliness of the right-of-way would appear to be equally as important as making ticket offices and passenger stations pleasing to the eye. No expense is spared in making city ticket offices attractive, and an increasing amount of attention is being given to the modernization of passenger stations to meet the competition of other modes of travel. Certainly a well-kept right-of-way is in keeping with other innovations designed to make rail travel attractive to patrons.

While there may be some question as to the effectiveness of the leveling of the right-of-way in promoting drainage, there are cases where it has materially improved conditions, and, for this reason, it should be given serious consideration as a means of accomplishing this end. Smooth right-of-way grades and slopes are essential to the control of weeds since they permit the operation of power mowing machines with a material saving in labor. In addition, a properly graded right-of-way permits of the more extensive use of off-track equipment for general maintenance work. With the use of this type of work equipment constantly increasing, the necessity for maintaining the right-of-way in a condition that will enable such equipment to obtain access to the track is a consideration of growing importance. When the advantages of a level right-of-way are summed up they appear to justify careful consideration on the part of maintenance officers and management.

When Renew Water Tanks?

How does one determine when a wooden water tank requires renewal? A steel tank? What are the indications?

By Careful Inspection

By J. H. Davidson
Water Engineer, Missouri-Kansas-Texas Lines, Parsons Kan.

Usually a wood water tank can be kept in service by proper maintenance until the wood has deteriorated to such an extent that excessive leakage can no longer be avoided, or there is danger of actual collapse. Continual leaking which cannot be stopped by the usual methods, such as calking, tightening the hoops or applying some sort of compound to the interior of the tank, is an indication of such deterioration. A careful inspection of the staves and the bottom of the tank will disclose how badly the wood has decayed. Frequent systematic inspection of both the tank and the substructure should constitute a routine procedure, and if needed repairs are made promptly the life of the tank can be extended and the danger of collapse avoided.

Rusting and pitting are the causes that lead to failure of steel water tanks; consequently, frequent inspections of such tanks will determine their condition and the necessity for renewal. By repairing small pitted places by spot welding the renewal of the tank can be deferred until the metal has wasted away to such an extent that repairs cannot be made economically or until the tank material has become so thin that it is no longer safe to keep it in service. Tanks which show considerable rusting or pitting should be inspected carefully at frequent intervals with the objective in mind of renewing them before actual failure occurs.

A Controversial Subject

By C. R. Knowles
Superintendent of Water Service (Retired), Illinois Central, Chicago

The question of when wood or steel tanks should be renewed because of deterioration has long been a subject of considerable controversy. It has probably been the cause of more debates than the issues surrounding the renewal of any other railway facility or appurtenance, with the possible exception of rail. No matter how long or how badly decayed or otherwise deteriorated a water tank of wood or steel construction may be, it seems that it can always be kept in service by patching it up.

The latter statement is particularly true when applied to wood tanks. There are instances on record of old wood tanks remaining in service 10 and even 20 years after having been scheduled for renewal. With more than 40 years' experience in water service I have never known of a railway water tank failing to the extent that it could not be repaired, with the single exception of failures involving the hoops. Where the bottom of a wood tank has failed a false bottom can be applied. If the staves are badly decayed they can be replaced by new members; in some cases it may be desirable to apply additional hoops to provide support for weakened staves. Where the tops of the staves are decayed they can be cut off, reducing the capacity of the tank to some extent but permitting it to be kept in service. If the chimes on the bottoms of the staves should fail, repairs can be made by spiking the staves to the planks in the bottom of the tank, assuming that the wood is sound enough to hold the nails. When this is done the tank can be made tight with oakum and pitch or a false bottom can be applied.

The condition of a wood tank is often predicated on the presence of leaks. However, in my opinion, leakage has no important bearing on the condition of the tank, as leaks may develop in tanks because of loose hoops, poorly fitted staves or bottom planks, uneven settling of the foundation or failure of the tank support. Older tanks may remain water tight even though the timber has become badly decayed.

Unlike a wood tank, the condition of a steel tank is usually indicated by the presence of leakage, except where the trouble is due to the condition of the tower or the other supporting members. Leaks along the seams between the plates of a steel tank do not necessarily indicate the presence of serious deterioration unless excessive corrosion exists, and such leaks can usually be corrected by calking the seams. Leaks through the shell, however, usually indicate that, because cleaning and painting have been neglected, pitting and corrosion have done their handiwork, or possibly, in rare cases, this is an indication of electrolytic action or that the water handled is of an extremely corrosive nature. Such leaks are sometimes repaired by welding, but this procedure often causes additional leaks due to the fact that the heat causes displacement of the incrustation that forms with corrosion. Also, they may be temporarily repaired by patch bolts. However, such leaks indicate that the sheets are in poor condition and that other leaks might be expected. The solution is to replace the corroded sheets, which usually means that an entirely new bottom, or course of sheets, must be provided.

The life of a steel tank is dependent entirely on the maintenance that it receives. As a rule, the tower and sup-

ports, as well as the outside of the shell of the tank proper, are maintained in good condition by painting, with the interior of the tank being often neglected. Hence, the chief cause for concern is the condition of the interior of the tank, as experience has shown that in practically all cases the tank interior is in worse condition than the exterior, this being due partly to the difficulty of keeping the tank out of service long enough to permit the interior to be cleaned and painted.

In general, it may be said that both steel and wood tanks require renewal when it is more economical to build a new tank than to patch up the old.

Advises Drilling Holes

By L. G. Byrd
Supervisor of Bridges and Buildings, Missouri Pacific Lines, Poplar Bluff, Mo.

There are several important factors to be considered in determining the physical condition of wood water tanks. As it is not possible to make a thoroughly satisfactory inspection of the condition of the staves and the tank bottom from the outside, it is necessary to drain the tank so that it can be inspected from the interior. A thorough inspection can be made by means of a small instrument, known as an increment borer, by means of which holes can be drilled into the staves on the inside of the tank to determine the depth to which decay has penetrated. This should be done likewise from the outside.

During my experience with this problem I have found a large number of tanks in fairly good condition that could be continued in service for several years simply by renewing a few staves. If the staves of a tank are found to be in good condition but with a failed bottom, and the chimes in a decayed condition or broken, it is practicable to renew the bottom on the old timber by using concrete. On one division several wood water tanks of 100,000 gal. capacity each were listed on the program for renewal, but after my arrival on the division they were repaired using a few second-hand staves and placing a concrete bottom in each of them, as the result of which they are still giving good service after 20 years.

Wood tubs often fail near the top because they are allowed to stay dry for a long period, causing an alternately wet-and-dry condition to prevail. When this happens it becomes necessary to cut off one or two feet from the top of the tank. By doing this on the road with which I am connected it has been possible to maintain the tanks in service for many years.

When steel tanks have been in service for many years they should be inspected by drilling small holes through the steel at the weakest appearing points, and from the thickness of the metal at such points it will be possible to determine whether they should be renewed. The first signs of failure of a steel tank or cylinder having a steel bottom placed on masonry supports will be noted at the bottom of the tank, or at the top if a roof is constructed over it. If a steel tank should develop weak points they will become evident by the buckling of the metal.

Hoists for Bridge Gangs

What are the advantages and disadvantages of hand-operated, air and electric hoists for the use of bridge gangs? For what classes of work is each best suited?

In Steel Bridge Work

By A. M. Knowles
Engineer of Structures (Retired), Erie, Winter Park, Fla.

Since my experience, in so far as the use of the various types of hoists by bridge gangs is concerned, has been confined to steel bridge work, this answer to the question will deal with the subject from this viewpoint. The use of chain hand hoists by steel bridge gangs on the Erie is confined to two operations, namely, (1) In the system steel fabricating shop where they are mounted on push trolleys on I-beam runways to serve various parts of the storage yard, fabricating shop and assembly yard, and (2) in the doorways of tool cars for handling heavy portable equipment, such as electric welders, in and out of the cars. These hoists have proved very satisfactory for such purposes. While the efficiency of the shop hoists might be improved to some extent if they were operated electrically, it is thought that their use is not sufficiently intensive to warrant the extra cost of electrification.

The hand-operated line and sheave type hoist is, of course, indispensable in bridge work for handling staging and light bridge parts, and for many other purposes. The use that we have made of the air hoist in bridge work has been confined to the drum type with a steel cable operating over one or more sheaves. Such hoists are very flexible, being adaptable to a wide variety of operations. Some of their more important uses are as follows: (1) For sliding out old complete bridge spans and replacing them with the new construction, especially in situations where traffic is such as to require the least interruption; (2) on portable derricks for loading or unloading steel or timbers or handling light bridge members, such as stringers, floor beams and bridge ties; (3) for handling the dismantling and erection of steel when strengthening viaduct towers as high as 200 ft.; (4) for drawing long cover plates or other parts into place when reinforcing girders and trusses; and (5) for raising and lowering steel members or complete light bridges on gin poles.

Our bridge gangs have never been equipped with electric hoists but we have used gas engines and hoists to some extent with good results.

A Long History

By A. E. Bechtelheimer
Engineer Bridges, Chicago & North Western, Chicago

Ever since the existence of man was placed on an organized basis, hoisting arrangements have been in common use. The early types of such devices assumed various forms, such as the bar, the sliding plane, the lever, the windlass, and the pulley, including the many modifications of the latter. From the beginning, man's own strength has been the chief source of power for manipulating these hoists. As time went by, the simple hoisting mechanisms were modified and improved to make it possible to handle heavier loads, using the same or less man-power, and also to permit work to be done in less time. The hand-operated hoisting arrangements that are now in common use for various applications include the block and tackle, the chain ratchet, and various gear arrangements, utilizing both worm and spur gears.

Most of these types of hoists are used by railway bridge and building crews in both timber and steel work. In fact, the diversity of the operations to be performed requires, at times, the use in such work of all the various types and forms of hoists. Owing to the many small isolated jobs that must be performed by railway bridge gangs, man-power is still the prime mover. In many such applications special supports for the hoists are re-

quired, such as "A" frames, tripods, gin poles, etc., although where possible it is desirable to use a simpler form of hoist that does not require a special support.

Power hoists are employed where their use is possible and convenient. Because the air compressor is a convenient and reliable source of power, pneumatic hoists are in common use by bridge gangs. This type of hoist can be used for both vertical lifts and for pulling objects horizontally. It is relatively small in size and light in weight and, by using multiple-sheave blocks, extremely heavy loads can be moved. For these reasons the provision of a pneumatic hoist with each set of outfit cars is justified even though it may be used only infrequently.

The electric hoist has a wide range of uses around shops and terminals where current for its operation is available. Such installations are generally permanent in character and are often in more or less continuous use throughout the work. They have a wide variety of uses, their speed of operation is high, and loads varying greatly in size and weight can be handled efficiently with them.

Requirements for Ties

What are the physical requirements for ties? For their manufacture? For their inspection? Should these requirements be relaxed in a time of tie shortage? Why?

Relaxation Not Desirable

By R. Lumpkin
Assistant Maintenance Engineer, Chicago, Rock Island & Pacific, Chicago

Because of the purpose for which crossties are manufactured, and the rigorous conditions to which they are subjected in service, it is important that they be free from any defects that would impair their strength or durability, such as decay, splits, shakes, etc. It is important, therefore, that crossties be uniform as to size and shape, that they be well hewed or sawed, that they be cut square at the ends, that the bottom and top be parallel, and that the bark is entirely removed, to afford the best results from treatment. Crossties should preferably be inspected at the time of loading, but in any event this should be done prior to acceptance, and, furthermore, they should be inspected at a time when all sides and ends are visible to eliminate those with defects that might be detrimental to obtaining the full service life.

Shortages of crossties are usually the result of a limited supply of labor, and it is doubtful whether any substantial increase in production could be achieved by relaxing the requirements governing quality. The timber from which the ties are made in each territory usually governs the quality of the ties produced. For this reason, in view of the long-range considerations involved, there is little, in my opinion, to be gained by relaxing the physical requirements for crossties. Such requirements have been determined by long experience, and any deviation from them would be more detrimental than any benefits that might be gained by a possible slight increase in the number of ties that could be produced to a lower standard.

Should Not Be Done

By C. D. Turley
Engineer of Ties and Treatment, Illinois Central, Chicago

Heavy wheel loads and ever-increasing speeds are having the effect of subjecting crossties to very severe service conditions. Long experience has taught us that only certain species of wood are able to withstand these conditions and otherwise meet the requirements demanded of crossties. The woods that are more commonly used for this purpose include oak, gum, beech, maple, pine, cypress and fir.

All ties must be free from defects that may impair their strength or durability, such as decay, large or numerous holes or knots, a slant of the grain that is greater than 1 in 15, or checks, shakes and splits. Well-manufactured ties are straight, well hewed or sawed, are cut square at the ends, have top and bottom faces that are parallel, and are free of bark. All ties should be inspected at the point where they are loaded on cars, or at the seasoning yard or treating plant. A reasonably close examination should be made of the top, bottom, sides and ends of the ties, and each tie should be judged independently of the others.

Crosstie specifications are a reflection of the experiences of the railroads over a long period of years. Any relaxation or deviation from them simply means the lowering of the efficiency of the tie and a shortening of its service life. To relax the specifications will not have the effect of making more ties available, with the single exception of accepting additional species of wood. During tie shortages the common tendency is to relax the specifications, but this should not be done if it is at all possible to maintain the track in a safe operating condition without doing it.

Center Stakes for Tangents

In an out-of-face surfacing program, should the center stakes for tangents be set ahead of or behind the surfacing gang? Why?

It Depends

By J. E. Fanning
Assistant to Chief Engineer, Illinois Central System, Chicago

If the general alinement of the track is to be changed appreciably by the removal of long swings, or for any other reason, it is preferable to set center and grade stakes in advance of out-of-face surfacing gangs. This will permit the track to be lined to the approximate final location before the ballast is unloaded and before the track is raised and tamped.

The center line should, whenever possible, be run to foresights at the ends of long bridges or at the summits of grades or other points of high elevation where a slight deviation from a perfectly straight line is less apparent. Permanent points on the center line, approximately 1,500 ft. apart, should be referenced so that the lines can be reproduced for final alinement of the track after the surfacing has been completed. This is desirable because there is always a probability that center stakes will be disturbed during surfacing work.

On the other hand, if the track is already in good general line, the center stakes can be set behind the surfacing gang provided the work can be done at a time when there will be no interference with, or delay to, the operations of the track or engineering forces. In my opinion, it will be found that, in the majority of cases, it is preferable to perform the work

in two operations, as follows: (1) Establish and reference the center line ahead of the gangs; and (2) reestablish the line and set the final center stakes after the track has been raised. This will avoid any interference with the gang and will prevent loss of time on the part of the engineering corps.

Should Be Set Ahead

By General Foreman

Frequently it has been found that center stakes for tangent track are either set behind the out-of-face surfacing gangs or are not set at all. The reason given for not setting the stakes ahead of the work is that, if this is done, they will be pushed out of position or displaced entirely by the surfacing gang. On the other hand when center stakes are set after the surfacing work has been completed and just ahead of the spotting and finishing gang it will be found extremely difficult to make necessary throws because of the "setting" of the ballast around the ties.

In view of the higher train speeds that are prevalent today any line swings in high-speed main track are intolerable, regardless of their lengths. For this reason everything possible should be done to secure perfect alinement, and the lining work should be carried out when it can be done with minimum effort. Some foremen are, of course, better track liners than others, but when the work is done behind the surfacing gang, even a good liner is not capable of obtaining the precision secured when center stakes are set in advance of the surfacing work, thereby permitting the track to be put on center and lined before it has become seated in the new bed and before the final ballasting.

In view of these considerations the following rule is offered as one that should be followed in all cases: "In rail laying work, center stakes should be set ahead of the rail laying and the track placed to center on all curves before new rail is laid, and on tangent track center stakes should be set ahead of the surfacing gangs and the track placed to center by them before the close of each day's work." The distance between center stakes should vary from about 50 ft. on curves to 150 to 200 ft. on tangents. Care must be exercised by all gangs to see that center stakes are undisturbed and that they remain in place until the final finishing work has been accomplished.

Color Schemes in Waiting Rooms

Under what conditions can one wall of a waiting or rest room be painted a color different from the others? What color distribution is required? Are there any advantages?

Under Many Conditions

By Architect

It seems to me that the device of painting one wall of a waiting room a color different from the others can be used under many conditions to achieve certain desired effects. For a long time architects and interior decorators have recognized the value of this expedient as a means of imparting character and adding to the appearance of a room, and now they have had their views confirmed by the findings of a new science, called "color dynamics," which teaches that color is a source of power and energy and that, as such, it may be used as a medium for producing different reactions in the minds of people.

Obviously, color dynamics covers infinitely more territory than that involved in using a different color for one wall of a room, but this small segment of the science, as applied to railroad waiting rooms, may be used to illustrate how different effects can be obtained. For instance, if a waiting room is square and uninteresting, much can be done to correct this situation by painting one of the walls a different color than the others. Indeed, when this is done a two-fold purpose may be achieved by selecting for such treatment that wall containing one or more facilities, such as the ticket office, to which it is desired to direct attention.

If the waiting room is long and narrow the proportions may, in effect, be equalized by painting one or both end walls a darker color than the longer side walls. This is true because dark colors have the effect of seeming to advance a wall, while, conversely, a lighter color will cause it to appear to recede.

The question of what color distribution is required is such a broad one that it can only be touched on here. Since, according to color dynamics, color schemes can be designed to produce, or aid in producing, any desired psychological reaction, railroad architects and engineers must keep in mind, when deciding on the color scheme for a waiting room, the reaction that it is desired to create in the minds of patrons. Another consideration is that, by means of the proper color, it may be desired to counteract an existing condition, such as too much (or an insufficient amount of) daylight illumination.

Many Advantages

By C. M. Angel
Engineer of Tests, Chesapeake & Ohio, Huntington, W. Va.

One wall of a waiting or rest room may be painted a color different from the others under any conditions in which it is desired to produce a pleasing contrast or to take advantage of light, as every color has a different wave length. In waiting rooms, the ticket offices and related facilities are usually built along one wall. By painting this side of the room in a color different from the others it instantly assumes greater prominence and becomes eye-catching. When this color is one which blends into the other colors of the room a psychological effect is produced which reduces nervous tension and imparts a feeling of relaxation and cheerfulness. When used in rest rooms, different colors are not only cheerful and restful but also are helpful in promoting sanitation by reason of the fact that the average person will be more interested and careful in seeing that cleanliness is maintained.

With reference to that part of the question regarding color distribution, the answer is that any combination of colors may be used to produce the desired effect of light, safety, durability, and cheerfulness.

There are many advantages to be obtained by painting one side of a room in a color different from the others. Color can either stimulate or depress. It can be used to focus attention on an object or to cause it to recede or to become absorbed by surrounding colors. It can be used to emphasize safety, to induce cheerfulness, and to aid in sanitation. All trucks that are used for loading and unloading express would immediately become more prominent if painted a focal yellow and striped in black. Similarly, traffic lanes, painted in color, would aid in reducing congestion on platforms and elsewhere. Likewise, doors become more prominent immediately when painted in colors.

Treated Timber for Repairs

Are there any advantages in using treated material for repairing buildings? Any disadvantages? Why?

Conditions Have Changed

By R. W. Cassidy

Assistant Supervisor Bridges and Buildings, Chesapeake & Ohio, Richmond, Va.

A large majority of the railway buildings now in existence were built when high-quality lumber was available in considerable quantities at a reasonable cost. The sills and posts of such buildings were usually constructed of heart pine and the joists, rafters and other framing were either heart pine or first-growth white oak. The siding and sheathing were usually heart pine or sometimes poplar.

Today the situation is quite different. The lumber now available is, with the exception of a few species, very inferior to that produced 50 years ago. It has, therefore, been found necessary to develop a material of equal quality with the lumber previously obtainable. In doing so, creosote and various types of salts have been brought into general use for the pressure treatment of lumber. Pressure-treated creosoted lumber is resistant to decay, to attack by termites, and, when used in marine structures, it reduces attack by teredo. Creosoted lumber is particularly advantageous when used for sills, posts and floor joists in buildings where these parts come in contact with, or are near, the earth, as the creosote will not leach out and such lumber has a much longer service life than similar untreated material.

Creosoted lumber is inflammable and, when ignited, the fire spreads rapidly, requiring that special chemicals be used to extinguish the blaze. Also, it is difficult to paint creosoted lumber successfully. The use of creosoted lumber for floors and platform decking is somewhat undesirable as high-class freight may be damaged by the bleeding that occurs, and the fire hazard presented by the presence of the creosote may be a disadvantage.

The making of minor repairs with creosoted lumber is an expensive matter due to the fact that the full life of the lumber is not secured because of the renailing that is necessary when later repairs are made. Since creosote softens lumber, longer and larger nails are required, and renailing should be avoided whenever possible.

The use of various kinds of preservative salts to prolong the life of building lumber and to protect it from termite attacks is more desirable for general building repairs. For such structures as stations and small office and roadway buildings, where neat appearance and economical maintenance are of major importance, salt-treated lumber may be used effectively. Where this class of treatment is used, the material is paintable, and a certain amount of fire protection is afforded in that the flame is not supported. When used in platforms and walkways on the exteriors of buildings, salt-treated timber gives a longer service life without the undesirable qualities of creosote.

In buildings such as roundhouses, freight stations, warehouses, piers and wharves, where costly equipment and large quantities of freight are handled, the use of timber treated with a heavy concentration of salts and fire-retarding chemicals is strongly recommended. It is particularly desirable to use this class of treated timber in the floors and roofs, as these portions of the structure usually fail first and are the points where fires most often originate.

For making minor repairs and for doing small patching jobs on a building or platform, salt-treated timber is not recommended. It is usually the case that future heavy repairs or out-of-face renewals are necessary before the full service life of the treated lumber is obtained. Any disadvantages or objections involved in the use of timber properly treated with salts, kiln dried after treatment and given adequate protection before installation, are not known to the writer.

Has Many Advantages

By L. E. Peyser

Principal Assistant Architect, Southern Pacific Company, San Francisco, Cal.

The many advantages that can be cited for the use of treated materials in new construction are equally applicable in connection with repair work. The mere fact that repairs are undertaken indicates a deterioration of the materials originally used, due possibly to false economy or improper design. This condition, unless corrected, can be expected to be progressive. The cause that has resulted in the failure of one part will no doubt in time result in failure of other similar parts subjected to the same deteriorating agency, excepting of course failure due to mechanical injury.

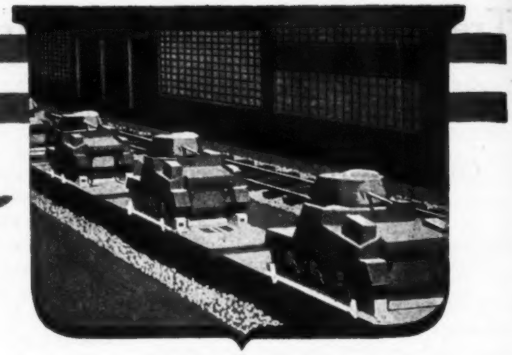
This being a fact, there can be no valid argument against the use of treated materials in effecting repairs, thus eliminating the possibility of the recurrence of the failure to the extent that treated material has longer life expectancy than untreated. Where the failure has occurred in such members as foundation sills, floor construction, sleepers, etc., that are in contact with the ground, good judgment would indicate that wood should not again be used, but rather that replacement be made in concrete or other imperishable material. In the event that the use of masonry is, for any reason, impracticable, then certainly treated materials should be used. Except for such instances, future heavy maintenance costs can be greatly reduced, if not entirely eliminated, by the use of treated lumber, selecting a treatment which has been carefully determined after a study of the particular conditions causing the failure.

If failure has been caused by decay, proper treatment will prevent the new material from becoming infected from adjacent old material. If failure is due to termite infestation, a properly selected treatment will inhibit further spread of the termites.

Fortunately there are different types of treatment available that are suitable for use under each particular condition in the structure, and for this reason they should be selected carefully with the end in view of using the one that is best suited for each set of conditions. In structures subjected to a gassy or smoky atmosphere, the more perishable items, such as sash, trim and other members that are small in section, might well be of treated wood. If so, minor failures of the paint coating, or loss of protection due to failure to paint the parts frequently enough, will not result in complete loss of the material, since it is protected from within by the treatment and is, therefore, not entirely dependent on the surface film for protection. Wisdom, however, would dictate that all available means of protection be used.

It is not possible to set forth in the space available all parts of a structure where it might be desirable to use treated material. In general, however, it is felt that, if in doubt, it is preferable to err somewhat in the direction of over-treated materials rather than the reverse, with the possibility that within a relatively short time repairs might again become necessary. The greater cost of treated, as compared with untreated, material is relatively small, while the labor costs involved in making repairs are considerable; therefore, the use of treated material is in the final analysis a real economy that must not be overlooked when repairs to buildings are being planned.

NEWS of the Month



Railway Engineers Promoted

Headquarters, Transportation Corps, Paris, has reported a number of promotions to men in the 706th Railway Grand Division, now operating in Germany. Maintenance men who received promotions were Lt. Col. Jack W. Buford, formerly track supervisor on the Pennsylvania, at Akron, Ohio, and now executive officer and assistant general superintendent of the 706th Grand Division, advanced from rank of major; Major Edwin G. Adams, Jr., formerly assistant real estate supervisor, Eastern region, Pennsylvania, at Philadelphia, Pa., and now acting as engineer of track and structures of the 706th, elevated from the rank of captain; and Captain David C. Hastings, promoted from first lieutenant, and now assistant engineer of track for the Grand Division. Capt. Hastings, who is the son of E. M. Hastings, chief engineer of the Richmond, Fredericsburg & Potomac, was assistant supervisor of track on the Pennsylvania, at Pittsburgh, Pa.

S. P. Pays Tribute To Mexican Nationals

In recognition of the work of the more than 12,000 Mexican Nationals now employed on the Southern Pacific, a two-page tribute, written in Spanish, was recently distributed among these men by the company, on the occasion of the Mexican holiday "Cinco de Mayo." The tribute reproduces a portion of a statement made by Southern Pacific President A. T. Mercier, in which he told President Manuel Avila Camacho of the Republic of Mexico, of the Southern Pacific's appreciation for the work of these men and the co-operation of the Mexican government.

Commenting, Mr. Mercier pointed out that the present force of 12,000 Mexican Nationals had grown from an original group of 513, first employed in May, 1943. "Without their help, I do not see how we could have handled the wartime traffic," Mr. Mercier stated.

Workers on Western Roads Get Deferment Until October

On June 26, Selective Service ordered deferment of all workers on western railroads until October, to aid these roads in handling the increased movement of troops and supplies to the Pacific coast. The railroads covered by the order are those operating west of Lake Michigan, the Illinois-Indiana state line and the Mississippi river. Approximately 30,000 employees on these roads are affected by the order, which applies to maintenance workers as well as those in actual transportation jobs.

According to Col. I. S. Morris, Chairman of the Western Railroad Emergency Committee, the railroads operating west from Chicago need 90,000 additional workers to handle the movement of military traffic to the Pacific coast during the coming summer and fall months, which is expected to include 6,000 to 8,000 soldiers and sailors daily, in addition to necessary civilian travel. The roads most affected by the deferment order are those transcontinental routes with Pacific terminals, including the Chicago & North Western-Union Pacific; the Santa Fe; the Burlington-Denver & Rio Grande-Western Pacific; the Great Northern; the Northern Pacific; the Milwaukee; and the Rock Island-Southern Pacific.

As of April 30, the latest date for which detailed figures are available, unfilled openings for railroad workers for the roads of the country as a whole, according to the Railroad Retirement Board, totaled 97,774, compared with 94,738 on March 31.

More Steel Allotted To Rail Carriers by W.P.B.

Increased quantities of steel have been allotted by the War Production Board for use by the transportation industry during the third quarter of 1945. Total allocations of carbon steel are placed at 1,339,558 short tons, which is 87 per cent of the 1,532,136 tons estimated as the minimum third quarter requirement by the Office of Defense Transportation. This compares with only 70 per cent of the O.D.T. requirement allocated for the second quarter.

Carbon steel allotments for some of the more important rail transportation items in the third quarter are as follows:

Replacement Rail: 600,000 tons requested; 495,000 tons allotted for railroads, 13,500 for transit lines. This compares with a total allotment of 428,000 tons in the second quarter.

Track Accessories: Requirements, 300,000 tons; allotment, 244,500 tons for railroads, 4,500 tons for transit lines.

Locomotives: Requirements, 45,000 tons, all allotted.

Freight Cars: Requirements, 227,000 tons; 220,000 tons allotted. This amount of steel is expected to permit the construction of about 11,000 freight cars now scheduled for completion during the fourth quarter of this year.

Passenger Cars: Requirements, 7,348 tons of carbon steel; 5,000 tons allotted, plus 5,500 tons of alloy steel. This amount of steel is expected to allow the construction of 250 coaches, head-end cars and non-luxury type diners scheduled for delivery during the first quarter of 1946, the first authorized since 1942. The present program calls for the delivery of 250 passenger cars quarterly commencing early in 1946.

President Asks Civilians Curtail Travel

Appraising the transportation job ahead as "even bigger" than the "miracle" performed by the carriers during the first phase of the war, President Truman recently called upon the public to "lend co-operation in order that the burden may be minimized." The President made his statement at a June 7 press conference, and he said in response to questions that he was prepared to establish travel rationing if it becomes necessary, although he hopes it will not be necessary to revert to this system.

Mr. Truman's statement included a prediction that it will probably be necessary to reduce the sleeping car equipment assigned to regular trains by 50 per cent in order to obtain equipment for troop movements. "Thus," it added, "the various transportation restrictions will not only be retained but undoubtedly increased."

The President's appeal was followed by statements by Colonel J. Monroe Johnson, director of the Office of Defense Transportation, on June 9 and 12, in which Colonel Johnson intimated that it may soon be necessary to curtail local group meetings not now covered by the ban on conventions. Also, that "if the need is indicated" formal restrictions will be imposed on large users of transportation, such as "sports, entertainment, commercial concerns and other enterprises."

Colonel Johnson stated that civilian travelers will soon have to get along with 25 per cent of the Pullman facilities heretofore available to them, due to the fact that at the same time that half of the Pullmans are diverted from their regular assignments to troop movement, additional furloughees will be seeking Pullman accommodations. He put the prospective cut in civilian coach facilities at from 10 to 12 per cent. The O.D.T. director predicted that it will be impossible for a civilian, "without some help" to get travel accommodations to the West coast after July 1.

Changes in Railway Personnel

General

W. S. Sloatman, division engineer on the Reading, at Tamaqua, Pa., has been promoted to assistant superintendent, at Reading, Pa.

A. B. Harrison, roadmaster on the Chicago, Rock Island & Pacific, at Holdenville, Okla., has been promoted to trainmaster.

F. J. Pokorny, office engineer on the Denver & Rio Grande Western, at Salt Lake City, Utah, has been promoted to assistant superintendent of the Salt Lake division, with the same headquarters.

R. S. McCormick, general superintendent and chief engineer of the Algoma Central & Hudson Bay, at Sault Ste. Marie, Ont., has retired, but will remain as consulting engineer. The position of chief engineer has been abolished.

Bayard R. Gould, assistant superintendent of the Hocking division of the Chesapeake & Ohio, with headquarters at Columbus, Ohio, and an engineer by training and experience, has been promoted to superintendent, with the same headquarters.

William H. Oglesby, assistant division superintendent on the Southern, at Atlanta, Ga., and an engineer by training and experience, has been promoted to division superintendent, at Selma, Ala. Mr. Oglesby was born in Bedford County, Va., on September 27, 1912, and is a graduate of the Virginia Military Academy, Lexington, Va. He entered railway service on September 8, 1936, as a rodman on the Birmingham division of the Southern, subsequently serving as assistant track supervisor, track supervisor, assistant trainmaster and trainmaster on that and other divisions of the road until March 1, 1944, when he was promoted to assistant division superintendent.

Elmer L. Banion, whose promotion to assistant superintendent of the Arizona division of the Atchison, Topeka & Santa Fe was reported in the June issue, was born in Lincoln County, Oklahoma, in 1895 and entered railway service in the maintenance of way department of the Santa Fe in 1914. After serving in World War I from April, 1918 until July, 1919, Mr. Banion returned to Santa Fe service. In November, 1926, he was named roadmaster at Independence, Kan., serving subsequently at Marceline, Mo., and Topeka, Kan. In May, 1943, he was assigned to the staff of the general manager as general track foreman in charge of general rail laying, surfacing and extra-gang work, with headquarters at Topeka, remaining in this position until his recent promotion.

Leonard B. Allen, whose election to vice-president of the Chesapeake & Ohio, at Cleveland, Ohio, was reported in the May issue, was born in Lexington, Ky., and was graduated from the University of Kentucky in 1899, with the degree of Bachelor of Science in Civil Engineering. He entered railway service in that year as a masonry inspector on the Southern, becoming a resident engineer, construction, on the Chesapeake & Ohio later that same year. From 1902 to 1926, Mr. Allen served

Leonard B. Allen

consecutively as assistant engineer, maintenance of way; division engineer; engineer, maintenance of way; general superintendent; and superintendent, maintenance of way of the C. & O. In 1926, he was promoted to assistant to vice-president, and in 1933 he was transferred to Cleveland as assistant to executive vice-president of the C. & O., Nickel Plate and Pere Marquette. In 1940, Mr. Allen was further advanced to assistant to the president of the three roads. He was promoted to assistant vice-president—assistant to the president of the C. & O. in April, 1943.

Floyd E. Bates, whose promotion to executive assistant on the Missouri Pacific, with headquarters at St. Louis, Mo.,

Floyd E. Bates

was reported in the June issue, was born at Allison, Iowa, on January 3, 1889, and was graduated from the University of Wisconsin in 1908. Mr. Bates entered railroad service in the engineering department of the Chicago, Milwaukee, St. Paul & Pacific in 1908, but left the next year to go with the Kansas City Terminal as a draftsman. Eight months later he re-entered the service of the Milwaukee. He entered the employ of the Missouri Pacific on November 13, 1913, as an assistant engineer, and in 1919 he was promoted to assistant bridge engineer. On August 1, 1923, he was advanced to bridge engineer. Mr. Bates became chief engineer in July, 1938, remaining in this position until his recent appointment.

Engineering

E. M. Hastings, Jr., has been appointed wire crossing engineer of the Chesapeake & Ohio, at Richmond, Va.

Thomas L. Biggar, a foreman on the Chesapeake & Ohio, has been promoted to assistant cost engineer, at Covington, Ky.

H. A. Small, senior instrumentman on the Canadian National at Quebec City, Que., has been promoted to assistant division engineer at Hornepayne, Ont.

Roy P. Hart, whose promotion to chief engineer of the Missouri Pacific, with headquarters at St. Louis, Mo., was reported in the June issue, was born at Springfield, Mo., on February 14, 1892,

Roy P. Hart

and was graduated in civil engineering from the University of Missouri in June, 1913. He entered railway service with the Missouri Pacific at Omaha, Neb., on June 7, 1913, as a timekeeper for a system steel erection gang, later serving as assistant foreman and inspector on various bridge construction projects and as a draftsman, estimator and designer in the bridge department at St. Louis. In November, 1919, he was promoted to chief draftsman, and in February, 1931, he was advanced to assistant engineer. In the fall of 1938 he was advanced to assistant bridge engineer, and in February, 1941, he was promoted to bridge engineer, with headquarters at St. Louis. In November, 1943, he was advanced to assistant chief engineer, the position he held at the time of his new appointment.

H. H. Hall, assistant engineer, Western division, of the Chicago, St. Paul, Minneapolis & Omaha, a part of the Chicago & Northwestern system, at St. Paul, Minn., has been promoted to acting division engineer of the Black Hills division of the Chicago & Northwestern, at Chad-

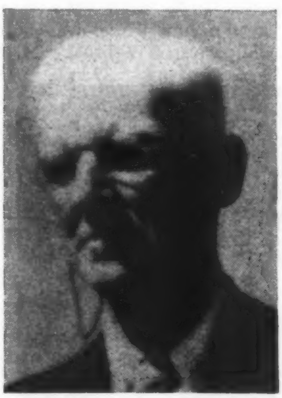
ron, Neb., succeeding **S. S. Long**, whose death on May 21 was reported in the June issue.

Howard C. Forman, formerly assistant engineer in charge of the miscellaneous department of the Louisville & Nashville, has been appointed special engineer, with headquarters as before at Louisville, Ky.

J. B. Hunley, engineer of structures of the New York Central Lines West of Buffalo, at Chicago, has been appointed consulting engineer. **George E. Robinson**, assistant engineer of structures, at Chicago, has been promoted to engineer of structures, succeeding Mr. Hunley.

W. H. Hudson, Jr., a senior transitman on the Northern division of the St. Louis Southwestern, has been promoted to assistant engineer on that division, with headquarters as before at Pine Bluff, Ark., a newly created position.

George Gillett Thomas, whose appointment as engineer of bridges of the Atlantic Coast Line, at Wilmington, N.C., was reported in the June issue, was born at Wilmington on January 25, 1883, and



George Gillett Thomas

attended the University of North Carolina. He entered railroading on December 31, 1906, as a draftsman in the mechanical department of the Atlantic Coast Line, and in November, 1911, he became draftsman, office of the engineer of bridges, in the engineering department. He was appointed resident engineer in the construction department in January, 1917, returning to the engineering department the following October as assistant engineer. In September, 1919, he was named office engineer, and one year later he became engineer of bridges in charge of design, erection and maintenance of steel bridges. On November 1, 1929, Mr. Thomas was appointed engineer, metal structures at Wilmington, remaining in that post until his recent assignment as engineer of bridges in charge of design, erection and maintenance of all bridges on the system.

J. L. Charles, principal assistant engineer on the Canadian National, Western region, has been promoted to chief engineer, with headquarters as before at Winnipeg, Man. Mr. Charles succeeds **J. W. Porter**, who has retired.

Kenneth L. Miner, whose appointment as engineer of bridges of the New York Central Lines, Buffalo & East, at New York, was reported in the June issue, was born at Albany, N.Y., on August 26, 1888, and was graduated as a civil engineer from the University of Pennsylvania in 1912. He entered railroading with the

Kenneth L. Miner

New York Central on September 27, 1912, as chainman in the office of the division engineer at Albany, and served subsequently as rodman, bridge inspector, assistant supervisor of bridges and buildings, and supervisor of bridges and buildings successively, until the advent of World War II, when he was commissioned a captain in the Military Railway Service. Spending 21 months overseas, Capt. Miner was superintendent of structures of the 701st Railway Grand Division, his duties including the reconstruction of railway bridges, the opening up of tunnels, and re-establishment of other railway structures, first in North Africa, and later in Italy. Upon receiving his honorable discharge, Mr. Miner returned to New York Central service and was appointed engineer of bridges.

Gordon K. Fraser, whose appointment as district engineer, Southern Ontario district, of the Canadian National, with headquarters at Toronto, Ont., was re-

Gordon K. Fraser

ported in the May issue, was born at Montreal, Que., on September 11, 1901, and entered railroading as chainman on the Montreal division of the Canadian National in October, 1918. In January, 1923, he became rodman at Longlac, Ont., and the following year he served as instrumentman at St. Jerome, Que., Rouyn and Taschereau, successively. Mr. Fraser was named resident engineer at Taschereau in October, 1925, and in May, 1941, he became division engineer at Belleville, Ont., the post he held at the time of his recent appointment as district engineer at Toronto.

Ernest R. Logie, whose appointment as chief engineer, Central region, of the Canadian National, with headquarters at Toronto, Ont., was announced in the May issue, was born at Chatham, N.B., on August 16, 1886, and attended the University of New Brunswick. He entered railroading with the Grand Trunk Pacific (now the Canadian National) in 1907, and served as draftsman and instrumentman at Winnipeg, Man., and Edmonton, Alta., until 1910, when he joined the Bangor & Aroostook, as draftsman and resident engineer at Houlton, Me. After serving with the Algoma Central & Hudson Bay from 1911 to 1912, he became resident engineer on the Canadian Northern (now the Canadian National) at Grand Hog

Ernest R. Logie

River, Ont., and two years later he was named resident engineer of the Toronto Suburban Railway at Toronto. He served with the Toronto, Hamilton & Buffalo as resident engineer at Ft. Erie, Ont., and Hamilton from 1917 to 1919, when he became associated with the maintenance department of the Canadian National as resident engineer at Rosedale. On February 24, 1920, he was appointed division engineer of the Superior division, becoming office engineer at Toronto the following November. In June, 1921, he was named assistant engineer, and he remained in that position until March, 1928, when he was promoted to division engineer at Belleville, Ont. Mr. Logie was further advanced to district engineer of the Southern Ontario district, with headquarters at Toronto, in February, 1940, and on March 1, 1943, he was named engineer maintenance of way, Central region, at Toronto, the position he held at the time of his recent appointment.

Wayne M. Wells, supervisor of road on the Baltimore & Ohio, at Lima, Ohio, has been promoted to assistant division engineer on the St. Louis division, with headquarters at Washington, Ind., a new

position. Mr. Wells will have jurisdiction over the territory between Washington and Cincinnati, Ohio.

Fred E. Tardy, general track foreman on the Southern Pacific has been promoted to assistant division engineer on the Tucson division, at Tucson, Ariz.

Isaac H. White, instrumentman on the Chesapeake & Ohio, at Richmond, Va., has been advanced to assistant cost engineer, with the same headquarters, succeeding **Roger W. Cassidy,** whose promotion to assistant supervisor of bridges and buildings of the Richmond division is reported elsewhere in these columns.

Morris W. Clark, supervisor of building repairs on the Northern division of the Atlantic Coast Line, with headquarters at Savannah, Ga., has been promoted to office engineer, with headquarters at Wilmington, N.C.

John William Demcoe, assistant division engineer of the London division of the Canadian National Railways, with headquarters at London, Ont., has been promoted to division engineer of the Toronto Terminals division, with headquarters at Toronto, Ont. Mr. Demco was born at Kenora, Ont., on April 18, 1912, and graduated in civil engineering from the University of Manitoba in 1939. He entered railway service on August 1, 1939, as a structural draftsman in the bridge engineering department at Toronto and was appointed an instrumentman in the maintenance of way department of the Toronto Terminals division on November 1, 1940. On October 1, 1942, Mr. Demcoe was promoted to assistant engineer on the same division, and on February 15, 1944, he was advanced to assistant division engineer of the London division, which position he held until his recent promotion.

Harold F. Whitmore, whose promotion to assistant to the chief engineer of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio, was reported in the June issue, was born at Red House, N.Y., on May 25, 1890, and attended Ohio Northern University. He entered railway service in November, 1916, as a rodman on the Nickel Plate, later being advanced successively to instrumentman, draftsman and assistant engineer. In 1928 he was promoted to assistant district engineer of the Lake Erie & Western district, with headquarters at Indianapolis, Ind. Mr. Whitmore was advanced to division engineer of the Clover Leaf district, with headquarters at Frankfort, Ind., in 1939, and a year later he was transferred to the Lake Erie & Western district, with the same headquarters, which position he held until his recent promotion.

Charles Lester Crummett, whose promotion to division engineer of the Clifton Forge division of the Chesapeake & Ohio, at Clifton Forge, Va., was reported in the May issue, was born at West Augusta, Va., on February 3, 1902, and attended Virginia Polytechnic Institute. He entered railway service on August 1, 1928, as a carpenter (special assignment) on the Chesapeake & Ohio, at Clifton Forge. On February 1, 1943, Mr. Crummett was advanced to assistant division engineer at Richmond, which position he held until his recent promotion.

Track

H. A. Kramine has been appointed roadmaster on the Canadian National, at Hanna, Alta, succeeding **F. L. Nicholson,** who has retired.

B. E. Thompson has been appointed roadmaster on the Atlantic Coast Line, with headquarters at Goldsmith, N.C.

W. A. Garrett, section foreman, has been promoted to roadmaster on the Charleston & Western Carolina, with headquarters at Laurens, S.C.

G. B. Aydelott, trainmaster on the Denver & Rio Grande Western, at Provo, Utah, has been transferred to Gunnison, Colo., as trainmaster-roadmaster.

Armon Mills, roadmaster on the Chicago, Rock Island & Pacific, at Atlantic, Ia., has been transferred to Cedar Rapids, Ia., succeeding **J. W. Loftus,** who has been transferred to Atlantic, replacing Mr. Mills.

Ray E. Blaydes, supervisor of road on the Baltimore & Ohio, at Decatur, Ill., has been transferred to Flora, Ill. **Carl B. Brown,** general foreman, at Decatur, has been promoted to supervisor of road, succeeding Mr. Blaydes.

Carl C. Cavage, a chainman in the engineering corps of the New York Central, at Buffalo, N.Y., has been promoted to assistant supervisor of track, Buffalo division, with headquarters at Buffalo, a newly created position.

Alfred G. Norvell, general foreman on the Baltimore & Ohio, at Rossford, Ohio, has been promoted to supervisor of road, at Lima, Ohio, succeeding **Wayne M. Wells,** whose promotion to assistant division engineer, at Washington, Ind., is reported elsewhere in these columns.

H. F. Curtis, track supervisor on the Plains division of the Atchison, Topeka & Santa Fe, at Amarillo, Tex., has been promoted to acting roadmaster at Woodward, Okla., succeeding **C. O. Enlow,** who has been granted a leave of absence because of ill health.

R. H. Becker, section foreman on the Chicago, Milwaukee, St. Paul & Pacific, at Atkins, Ia., and who has been serving as relieving roadmaster at various points, has been promoted to roadmaster at Monticello, Ia., succeeding **A. H. Hobart,** who has retired.

H. B. Orr, assistant cost engineer on the Chesapeake & Ohio, has been promoted to assistant supervisor of track at Hopetown, Ohio, succeeding **J. H. Barksdale,** who has been advanced to supervisor of track at St. Albans, W. Va. Mr. Barksdale replaces **Erle T. Rucker,** whose promotion to assistant division engineer at Richmond, Va., was reported in the May issue.

W. S. Pigford, roadmaster-assistant trainmaster of the South Plains and Denver Northern lines of the Ft. Worth and Denver City, at Childress, Tex., has been transferred to the Amarillo division, at Amarillo, Tex., as roadmaster, succeeding **R. C. Williams.** Mr. Williams has been appointed roadmaster-assistant trainmaster at Childress, in place of Mr. Pigford.

Theodore B. Thompson, chief operator, rail detector car on the Illinois Central, has been promoted to supervisor of detector cars, with headquarters at Carbondale, Ill.

J. Walter Cozzens, assistant supervisor of track on the Pennsylvania, at Wilmington, Del., has been promoted to supervisor of track on the Monongahela division, at Homestead, Pa., succeeding **W. K. Mangum,** who has been transferred to Northumberland, Pa.

William Ware, instrumentman on the Arkansas division of the Chicago, Rock Island & Pacific, at Little Rock, Ark., has been promoted to roadmaster at Little Rock, succeeding **G. B. Winters.** Mr. Winters has been assigned the territory previously supervised by **A. J. Winters,** who has been transferred from Little Rock to Holdenville, Okla., replacing **A. B. Harrison,** whose promotion to trainmaster is reported elsewhere.

C. M. Richardson, roadmaster on the Atchison, Topeka & Santa Fe, at Marceline, Mo., has been promoted to general track foreman, with headquarters at Topeka, Kan., replacing **E. L. Banion,** whose promotion to assistant superintendent at Needles, Ariz., was reported in the June issue. **Arvel Youngblood,** track supervisor at Shopton, Ia., has been advanced to roadmaster at Marceline, succeeding Mr. Richardson.

L. E. Webb, track supervisor on the Illinois Central, at Decatur, Ill., has been transferred to Carbondale, Ill., succeeding **R. A. Trammal,** whose death is reported elsewhere in these columns. **F. E. Mayne,** supervisor of track at Olney, Ill., has been transferred to Decatur, relieving Mr. Webb. Mr. Mayne is replaced by **P. R. Henderson,** who has been on leave of absence to serve with the United States Railway Mission to Mexico.

Bridge and Building

Donald M. Yaw, assistant master carpenter on the Erie, at Youngstown, Ohio, has been promoted to master carpenter of the Buffalo and Rochester divisions, with headquarters at Buffalo, N.Y., succeeding **Paul Knapp,** who has been transferred to Jersey City, N.J. Mr. Knapp relieves **Manley Smith,** who has been granted a leave of absence because of ill health. **G. S. Durston,** senior transitman at Jersey City, has been advanced to assistant master carpenter at Youngstown, replacing Mr. Yaw.

Thomas R. Godley, a section foreman on the Portland division of the Southern Pacific, has been promoted to roadmaster at Oakridge, Ore., succeeding **James J. Doyle,** who has been transferred to a similar post on the Shasta Division. Mr. Godley entered the Southern Pacific's employ as a section laborer on the Portland division, and was promoted to section foreman in November, 1923, remaining in that position until his recent promotion.

A. A. McDermott has been appointed bridge and building supervisor of the Shasta division of the Southern Pacific (Pacific Lines), at Dunsmuir, Cal., succeeding **H. C. Crawford,** who has been transferred.

Roger W. Cassidy, assistant cost engineer on the Chesapeake & Ohio, at Richmond, Va., has been advanced to assistant supervisor of bridges and buildings on the Richmond division, with the same headquarters. His appointment is to a newly-created position.

A. N. Ford, a foreman in the building department of the Atlantic Coast Line, has been promoted to supervisor of building repairs, with headquarters at Savannah, Ga., succeeding **Morris W. Clark,** whose promotion to office engineer at Wilmington, N.C., is reported elsewhere in these columns.

Donald H. Jenkins, senior transitman on the Northern division of the St. Louis Southwestern, has been promoted to supervisor of bridges and buildings, with headquarters as before at Pine Bluff, Ark., succeeding **Charles J. Moore,** who has retired after nearly 55 years of service.

L. H. White, general foreman of bridges and buildings on the Illinois Central, has been promoted to supervisor of bridges and buildings of the St. Louis division, with headquarters as before at Carbondale, Ill. Mr. White succeeds **L. Sullivan,** who has been assigned to other duties with the company at his own request, account of ill health.

Obituary

William McCormick, assistant engineer on the Reading, died, at Philadelphia, Pa., on May 16.

R. A. Trammal, supervisor of track on the Illinois Central, at Carbondale, Ill., died at Carbondale on May 6.

John G. Sheldrick, resident engineer of the Minneapolis, St. Paul & Sault Ste. Marie, at Minneapolis, Minn., died in that city recently.

Clifford F. Edwards, division engineer of the Hocking division of the Chesapeake & Ohio, with headquarters at Columbus, Ohio, died on June 1.

H. T. Hazen, who retired in 1938 as chief engineer of the Atlantic region of the Canadian National, with headquarters at Moncton, N.B., died on May 4 at Oakville, Ont. Mr. Hazen was born at Truro, N.S., on March 14, 1870, and began his railway career in 1889. He was appointed engineer maintenance of way of the Canadian National in 1917, with headquarters at Toronto, Ont. In 1920 he was appointed acting chief engineer, and in 1922 chief engineer, with headquarters at Toronto. Upon the formation of the National system in 1923, Mr. Hazen was appointed assistant chief engineer of the Central region, with headquarters at Toronto, and in 1924 he was transferred to Montreal as assistant chief engineer of the system. He was appointed chief engineer of the Atlantic region on October 1, 1932, the position he held until his retirement.

Association News

Wood-Preservers' Association

Looking to the detailed formulation of the program of association work in the year ahead, the Executive committee of the association will meet in Chicago, at the Hotel Stevens, on July 10. Special consideration will be given at this meeting to the selection of the personnel of technical committees for the ensuing year.

Bridge and Building Association

President J. L. Varker has called a meeting of the Executive committee in Chicago on July 16 to review the preliminary drafts of the eight technical committee reports to be presented before the one-day restricted annual meeting of the association to be held at the Hotel Stevens, Chicago, on October 17. He is asking that, insofar as possible, all technical committee chairmen attend the Executive meeting in order to present their reports and to secure the benefit of suggestions made by those present.

Roadmasters' Association

The Executive committee of the association will meet in Chicago on July 10, with the primary purpose of reviewing preliminary drafts of the five technical committee reports now in preparation, to be presented at the restricted one-day annual meeting of the association to be held at the Hotel Stevens, Chicago, on September 12. President E. L. Banion is urging committee chairmen, insofar as possible, to present their reports before the Executive meeting in person, so that they might receive first-hand the benefit of suggestions by the officers of the association, looking to the completion of the final drafts of all committee reports by August 15.

American Railway Engineering Association

During June, seven standing committees of the association held meetings. These included the Committee on Highways, which met in Chicago on June 7; the Committee on Roadway and Ballast, which met at Chicago on June 12 and 13; the Committee on Economics of Railway Location and Operation, which met at Cleveland, Ohio, on June 13; the Committee on Wood Bridges and Trestles, which met at Chicago on June 19; the Committee on Buildings, which met at Cleveland on June 19 and 20; the Committee on Masonry, which met at Chicago on June 20 and 21; and the Committee on the Economics of Railway Labor, which met at Chicago on June 26.

To date only one committee has scheduled a meeting for July, this being the Committee on Water Service, Fire Protection and Sanitation, which will meet at Chicago on July 17.

The printing of the Proceedings for 1945 has been completed and the press sheets were delivered to the bindery early in June. However, because of the difficult conditions now prevailing, it is expected that the work of binding the Proceedings will not be completed until about the middle of August. The 1945 Annual Supplement to the Manual is expected to be ready for distribution to members shortly after July 1.

Wood-Preservers' Association

With the object of reducing costs and providing more efficient means of handling crossties from the woods, through treating plants to their destination, the Executive committee of the American Wood-Preservers' Association has appointed a special committee to investigate the handling of forest products. The committee has been charged with making a complete survey of existing methods of loading ties in the field; unloading them at treating plants from open, box and special tie cars; investigating methods and equipment used in stacking crossties for seasoning; loading and unloading trams; loading treated ties for shipment; and consideration of the types of freight train cars best suited to this purpose.

The special committe has been organized and plans are now well under way for a complete survey of all types of tie-handling equipment now in use. Later, if it is considered necessary to employ the services of engineering talent from outside the industry, a vigorous campaign will be launched to solicit a $50,000 fund to be contributed to by wood preserving companies, tie producers and railroads to develop efficient types of equipment for all phases of tie handling and transportation.

The personnel of the special committee comprises A. E. Larkin, general chairman (Republic Creosoting Co., Minneapolis, Minn.), and 12 members, who will also serve as district chairmen. According to present plans, as announced by General Chairman Larkin, the preliminary surveys will be carried on simultaneously in all districts, after which a meeting of the general committee will be called to consider the results. All members interested in tie handling, and in a position to contribute information of value on any phase of the problem, are urged to communicate with Chairman Larkin.

Supply Trade News

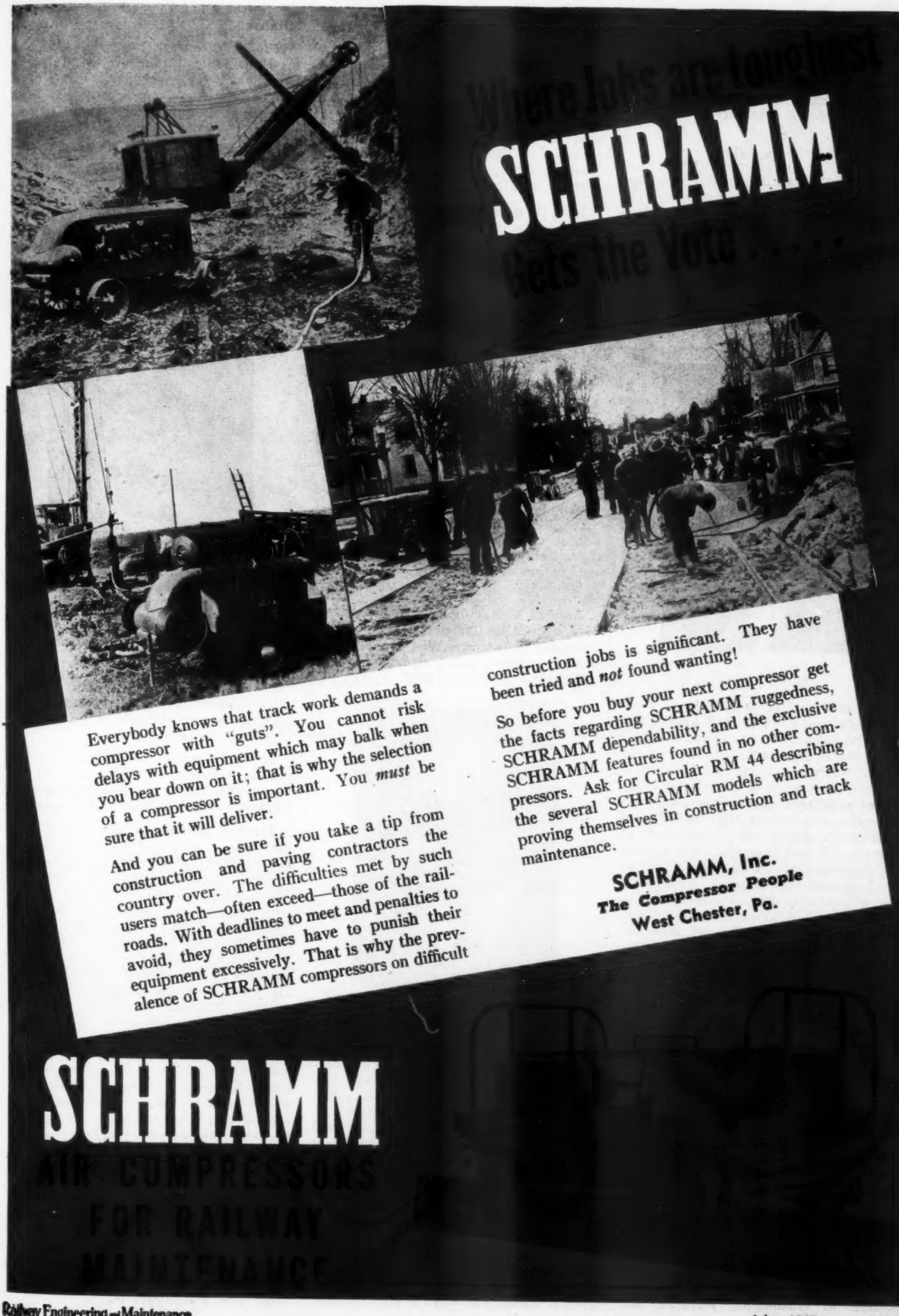
General

The employees of the Aurora, Ill., plant of the **Independent Pneumatic Tool Company** have been awarded their fourth renewal of the Army-Navy "E" production award.

The **John N. Thorp Company,** New York, has been appointed special railroad representative of the **Cleveland Pneumatic Tool Company** and the Rock Drill Division of that company for the eastern part of the United States east of Cleveland, Ohio, and north of Washington, D.C.

Shortridge Hardesty, formerly with Waddell & Hardesty, consulting engi-

(Continued on page 692)



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Everybody knows that track work demands a compressor with "guts". You cannot risk delays with equipment which may balk when you bear down on it; that is why the selection of a compressor is important. You *must* be sure that it will deliver.
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So before you buy your next compressor get the facts regarding SCHRAMM ruggedness, SCHRAMM dependability, and the exclusive SCHRAMM features found in no other compressors. Ask for Circular RM 44 describing the several SCHRAMM models which are proving themselves in construction and track maintenance.
SCHRAMM, Inc.
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SCHRAMM
AIR COMPRESSORS
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MAINTENANCE

neers, New York, announces a new engineering partnership with **Clinton D. Hanover, Jr.,** formerly chief of the bureau bridge design, Department of Public Works, New York, under the name **Hardesty & Hanover,** succeeding to the practice of **Waddell & Hardesty.**

Personal

Herman T. Schorle, executive engineer and assistant works manager of the Holyoke, Mass., works of the **Worthington Pump and Machinery Corporation,** Harrison, N.J., has been appointed works manager of that plant.

A. C. Laessig, vice-president of the **Woodings-Verona Tool Works** and the **Woodings Forge & Tool Company,** with headquarters at Verona, Pa., has been

A. C. Laessig

appointed special representative of **Hubbard & Co.** and the **Unit Rail Anchor Co., Inc.,** with headquarters at Chicago, to succeed **John S. Wincrantz,** who has retired after 25 years of service with Hubbard & Co. Mr. Laessig, who has an honorary Doctor of Science degree from Duquesne university, was born at Stirling, N.J., and obtained his public school education at Summit, N.J., and Paterson. After serving in the maintenance of way department of the Delaware, Lackawanna & Western from 1918 to 1925, Mr. Laessig went with the Verona Tool Works, where he was connected with the service and sales departments of this company, later becoming assistant to the president. In 1931, when the Verona Tool Works was acquired by the Woodings interests and renamed the Woodings-Verona Tool Works, Mr. Laessig became eastern sales manager of the new concern and also of the Woodings Forge & Tool Company. Several years later he was named vice-president of both concerns.

John Elwood, general superintendent of the tractor manufacturing division of the **Caterpillar Tractor Company,** Peoria, Ill., has been named assistant factory manager.

M. J. McMillan, manager of the Washington, D.C., office of the **Portland Cement Association,** Chicago, has been promoted to regional manager of the eastern offices, at 347 Madison Ave., New York. **James E. Dunn,** district engineer, at Richmond, Va., has been advanced to manager at Washington, replacing Mr. McMillan. **Gordon S. Maynard,** field engineer in North Carolina and Virginia, has been named district engineer at Richmond, succeeding Mr. Dunn.

J. T. Nolan has been appointed district representative of the **Jaeger Machine Company,** Columbus, Ohio. Mr. Nolan, who was formerly service engineer at Chicago of the Independent Pneumatic Tool Company, will have offices at 226 North La Salle St., Chicago.

John D. Ritchie, chief inspector of the **Douglas Fir Plywood Association,** has been promoted to chief of the research department, with headquarters as before at Tacoma, Wash., succeeding **J. D. Long. George M. Williams** has been appointed chief inspector, replacing Mr. Ritchie.

R. H. Smallwood has been appointed sales promotion manager of the **American Hoist & Derrick Co.,** St. Paul, Minn., and will be in charge of all advertising and publicity for the company. For the last ten years Mr. Smallwood has been advertising manager of Wm. A. Ziegler Co., distributors of construction, railroad and industrial machinery.

F. D. Haberkorn has been appointed assistant sales manager of the Central Sales division of the **Caterpillar Tractor Co.,** succeeding **F. E. Rusher,** resigned. **C. A. Barabe, Jr.,** has been appointed assistant sales manager of the Eastern Sales division.

Marshal L. Noel, industrial sales manager of the **Allis Chalmers Manufacturing Company,** Milwaukee, Wis., has been appointed general sales manager of the

Marshal L. Noel

tractor division. **William J. Faulkner,** manager of the Washington, D.C., office of the tractor division, has been advanced to industrial sales manager, succeeding Mr. Noel. **F. B. Harrison,** formerly a territory sales manager, and **E. G. Kullman** have been named assistant industrial sales managers. **Boyd S. Oberlink,** assistant industrial sales manager, has been appointed assistant to the vice-president, tractor division.

Edward M. Welty, assistant general manager of sales of the Industrial Fasteners division of the **Oliver Iron and Steel Corporation,** has been promoted to general manager of sales of that division, at Pittsburgh, Pa., succeeding **James S. Graham.**

Fred W. Deutsch has been appointed assistant sales manager of **Builders-Providence, Inc.,** Providence, R.I., a division of Builders Iron Foundry. He will be concerned with sales of Builders' line of water and sewage works equipment, and of recording, indicating and controlling instruments.

S. D. Means has been appointed manager of the industrial division of the sales department of **R. G. LeTourneau, Inc.,** Peoria, Ill., a newly created position. Mr. Means joined the LeTourneau staff in 1936, as manager of the governmental sales division, later serving as district sales and service representative in Peoria. Recently he has been stationed in Washington, D.C. As head of the industrial

S. D. Means

sales division, Mr. Means will give special attention to the sale of LeTourneau equipment to railroads.

W. Spraragen, executive secretary, has been appointed to the newly created position of director of the **Welding Research Council** of the Engineering Foundation.

Frank C. Hasse has been elected vice-president—mechanical department of the **Oxweld Railroad Service Company,** a unit of the Union Carbide & Carbon Corp. Mr. Hasse began his railroad career in 1904 with the Atchison, Topeka & Santa Fe. Thereafter, he was successively a fireman on the Chicago, Burlington & Quincy and a roundhouse foreman and general boiler foreman on the Illinois Central System. He started as an instructor with the Oxweld Railroad Service Company in 1913, and was assigned to the Chicago main office in 1916. He entered the Army as a captain in the last war and was appointed superintendent of construction at Camp Normyle, San Antonio, Tex. Subsequently he was made commanding officer of that camp. After rejoining the Oxweld Company in 1919, he was appointed superintendent of construction and maintenance, and, in 1927, general manager.

Obituary

Myron J. Czarniecki, vice-president in charge of sales of the A. M. Byers Company, died suddenly on June 18 at his home near Pittsburgh, Pa.

Substantial Economies in Track Maintenance Demonstrated by

PRESSURE GROUTING

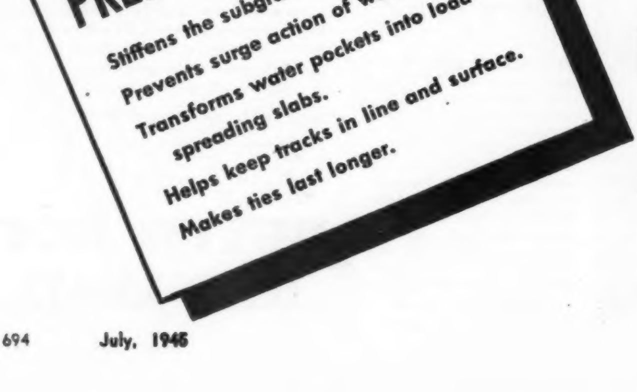
No slow orders. Grouting gang stands aside as fast train passes pressure grouting operation on Wabash Railroad, at Grabill, Ind.

It has been amply demonstrated during the past nine years that pressure grouting with portland cement under main-line track corrects subgrade troubles and consistently effects important savings in the maintenance of track.

One major railroad system which has grouted thousands of feet of track in many different locations reports that the amount saved by reduced maintenance within a few months, exceeded the entire expense of grouting.

Pressure grouting is now a standard maintenance operation on more than a score of major railroads. It requires no capital expenditure. Work may be done by foreman and small gang of track laborers with simple equipment.

Our engineers have developed valuable experience on grouting under field conditions. Let us help you determine how grouting can solve your track maintenance problems.



PORTLAND CEMENT ASSOCIATION

Dept. A7-27, 33 W. Grand Ave., Chicago 10, Ill.

A national organization to improve and extend the uses of concrete ...through scientific research and engineering field work

BUY AND KEEP MORE WAR BONDS

It is easy for the Nordberg Spike Puller to work in close quarters. This machine will pull 30 to 45 spikes per minute.

The removal of spikes, one of the difficult operations of rail laying, was made easy with the advent of the Nordberg Spike Puller. Even on bridges and trestles or at switches and guard rails, this machine is just as fast and does the job as easily as when working on open track. Rail laying is not slowed down at every bridge or switch due to the difficulty of pulling hard-to-reach spikes. By pulling spikes faster, the whole job of rail laying is speeded up. With only a few men required for this work as compared with hand pulling, the cost of spike removal is greatly reduced. If your rail laying gangs are not Nordberg Spike Puller equipped, investigate the advantages of this time and labor saving machine.

THESE NORDBERG MACHINES WERE DEVELOPED FOR YOUR MAINTENANCE JOBS

- Spike Puller
- Power Jack
- Track Wrench
- Adzing Machine
- Rail Grinders
- Rail Drill
- Track Shifter

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NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

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for BRIGGS & STRATTON ENGINES

During more than a quarter-century of *continuous* production of *"air-cooled power,"* Briggs & Stratton has been constantly recognized as the leaders in this field — and has earned foremost recognition for pioneering in improved design — for engineering advancements — and for constantly improved precision manufacture.

Their unequalled performance has again been proven by the brilliant record of Briggs & Stratton 4-cycle *air-cooled* gasoline engines in hundreds of standard and special wartime uses and applications. Their dependable service under severest conditions assures still greater service in the period ahead — through use on an ever increasing number of gasoline-powered appliances and equipment.

Air-Cooled Power — 4 CYCLE BRIGGS & STRATTON GASOLINE ENGINES

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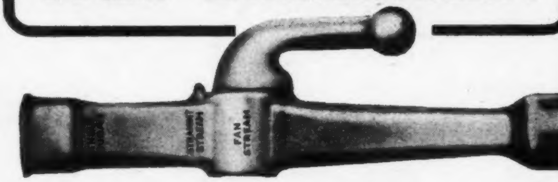
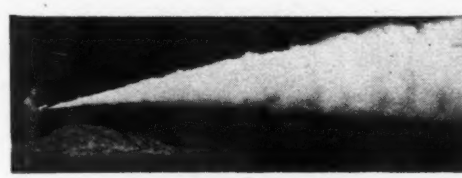
NOW...

NEW DUAL-STREAM NOZZLE *further steps up fire-killing punch of* DUGAS EXTINGUISHERS!



NEW DUAL-STREAM NOZZLE deals effectively with spill fires and fires difficult to reach because of height or obstructions. Designed for use with DUGAS wheeled extinguishers, the new Dual-Stream Nozzle greatly increases fire fighting range and effectiveness. A turn of the handle gives a *straight* stream with a range of 45 feet — or a *fan* stream with a range of 15 feet.



STRAIGHT STREAM
of fire-killing DUGAS Dry Chemical permits a large fire to be knocked down from a safe distance before operator goes in to extinguish it.

FAN STREAM
enables operator to concentrate heavy cloud of DUGAS Dry Chemical on fire and minimizes flash-backs.

Quick Facts about DUGAS Dry Chemical

- For extra-hazardous fires involving flammable gases, liquids, greases or electrical equipment.
- Not an electrical conductor.
- Non-toxic, non-corrosive, non-abrasive.
- Not affected by extreme cold or heat.

Write today for complete information regarding DUGAS Wheeled Extinguishers with the New Dual-Stream Nozzle... and DUGAS Hand Extinguishers.

AN ANSUL PRODUCT — duGas — THE MASTER OF FLAME

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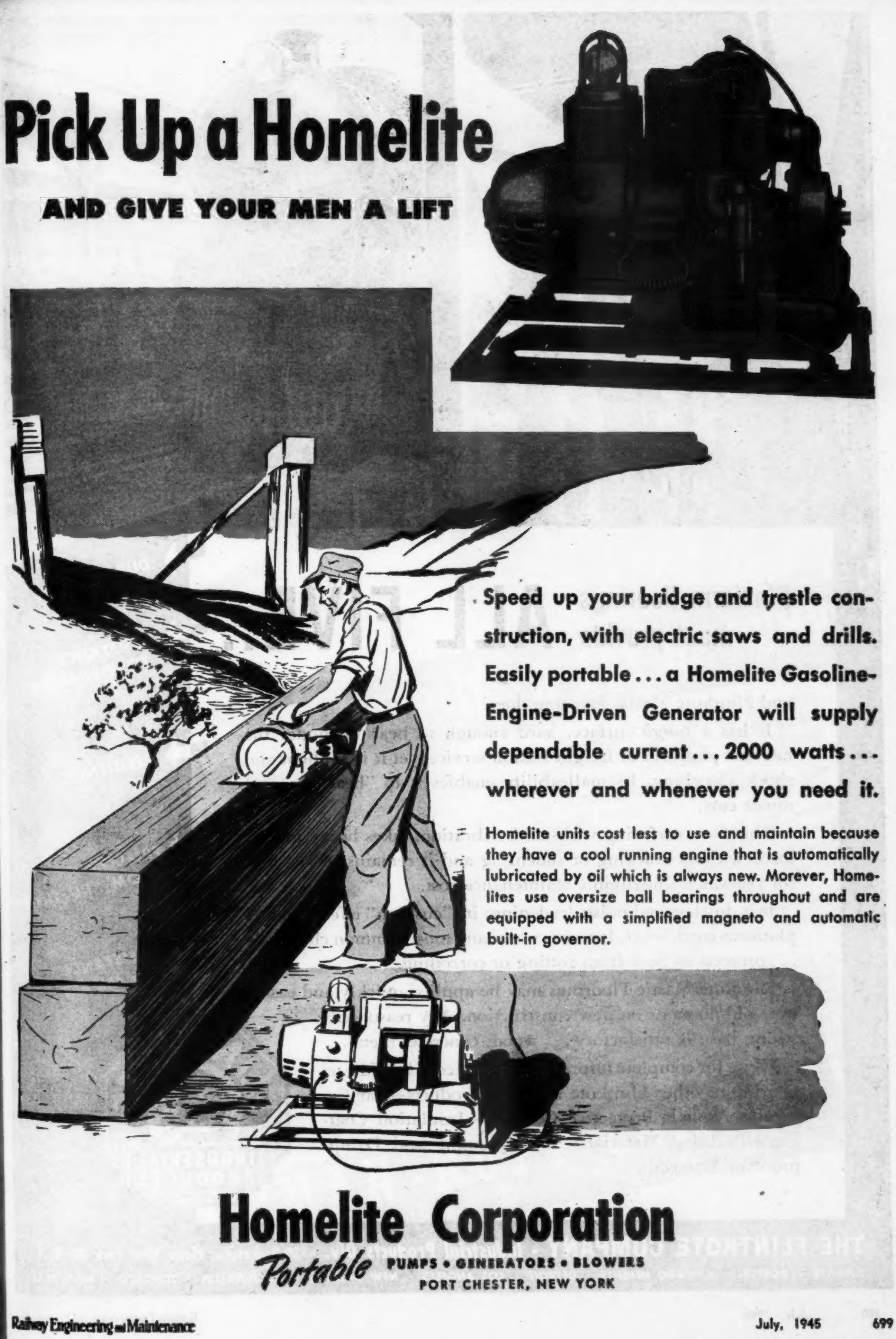
DUGAS 150-A WHEELED EXTINGUISHER

ANSUL CHEMICAL COMPANY, MARINETTE, WISCONSIN
DUGAS DIVISION



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Speed up your bridge and trestle construction, with electric saws and drills. Easily portable . . . a Homelite Gasoline-Engine-Driven Generator will supply dependable current . . . 2000 watts . . . wherever and whenever you need it.
Homelite units cost less to use and maintain because they have a cool running engine that is automatically lubricated by oil which is always new. Morever, Homelites use oversize ball bearings throughout and are equipped with a simplified magneto and automatic built-in governor.
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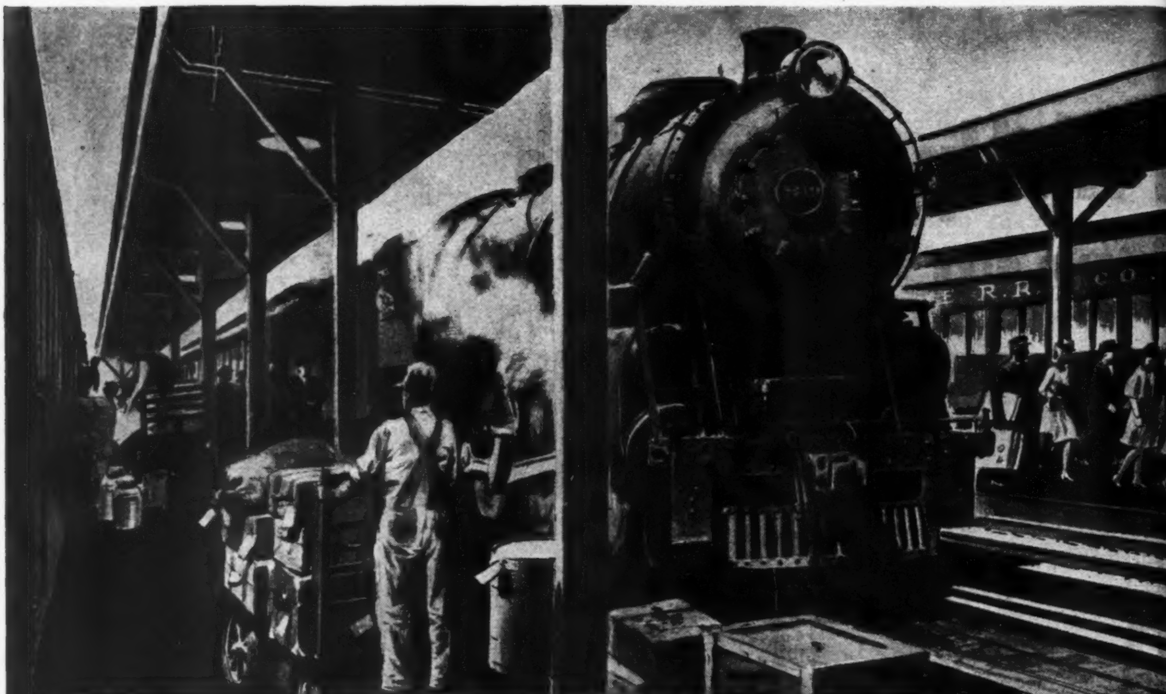

PAYROLL SAVINGS PLAN

NOW'S THE TIME FOR *Your* BIG "MOP-UP"!

RE-SOLICITATION is the keynote for a victorious "mop up" in the Mighty 7th War Loan. Bond rallies plus continuous competition between departments help to keep Bond subscriptions on a quota-topping climb. Strategic poster displays . . . showings of "Mr. & Mrs. America," the Treasury film . . . distribution of the War Finance Booklet, "How To Get There," and the handy Bond-holding envelopes play an important part. But, above all else, arrange to have every employee asked *once more*—and personally urged *once more*—to meet his personal quota in the Mighty 7th!

The Payroll Savings Plan is the mainstay of every War Loan—meeting your plant quota is vital to the success of the 7th! Remember we have to make two drives in 1945 do the work of three last year. Put on an intensive "mop up" final to help mop up the Japs, cut the tentacles of inflation—and lay the foundation of security.

THE MIGHTY 7th WAR LOAN

The Treasury Department acknowledges with appreciation the publication of this message by

Railway
Engineering and Maintenance

★ *This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council* ★

MORE WORK—
MORE SAVINGS—

With Burro Cranes

Burro Cranes are easy to handle, speedy and versatile. They're designed and built for railroad work—to do it faster, better, to save locomotive and work train hours in hauling and switching—to cut to a minimum the travel time between jobs—in short, to give you more crane hours on more different kinds of jobs under widely varying conditions. Burro Cranes not only pay their way with more and more continuous work, but they save you money besides in many items of operational expense.

Short Tail Swing
Independent Friction Clutches
Drawbar pull up to 7500 lbs.
Travel speeds up to 27 m.p.h.
Elevated Boom Heels
Low Overall height
Sets itself off and on track
Can be equipped for magnet, pile-driver, air-brakes, etc.

EVERY RAILROAD NEEDS BURRO CRANES
Write for Catalogs F-115 and F-120

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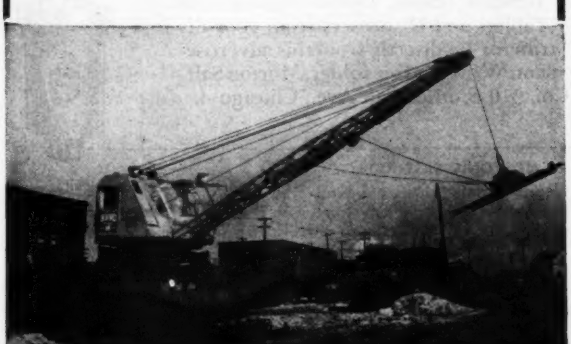

ARMORED FLOORS

CONCRETE floors disintegrate not only from abrasive wear due to heavy trucking, but also because of continuously wet conditions and attack by acids, oils and greases.

The quality of STONHARD STONPACH is such as to withstand abrasive wear and deterioration and to form a coat of armor on the surface of the floor itself.

In repairing busy factory floors, there is a limited amount of time in which the work can be done and in most cases it is inconvenient to move machinery and equipment. The use of STONHARD STONPACH for repairing ruts and holes in floors under these conditions provides the *easiest* and *quickest* way to re-establish a working area to profitable use.

A STONHARD STONPACH floor or repair can be placed at the close of the day and be ready for traffic the following morning.

No expert labor is required to apply STONHARD STONPACH . . . any man capable of handling a trowel can do the job.

TRIAL OFFER

We will send a drum of STONHARD STONPACH on trial to any responsible firm or institution—test its performance for 30 days under actual working conditions—if not satisfactory, we will cancel our invoice.

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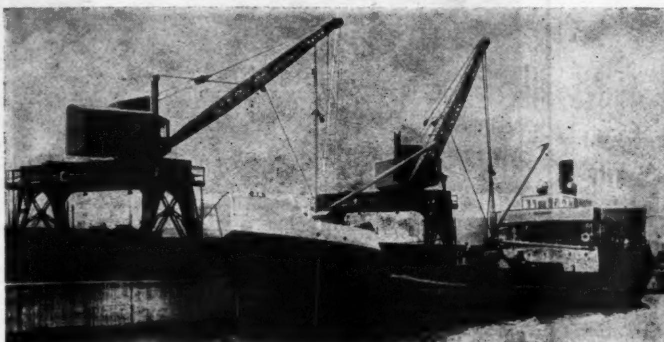
I·B CRANES DO MORE WORK AT LESS COST — EVERY DAY, EVERYWHERE

No matter whether your material handling job calls for portal pier cranes, coal and ore bridges, car dumpers or Diesel Locomotive cranes, Industrial Brownhoist equipment is unsurpassed. Right: An I.B. Diesel Locomotive Crane with patented Monitor-type cab which allows operator 360° visibility—known the world over for dependable, low cost performance. Below: Two I.B. 4 Motor Electric Cranes, on traveling portal piers, have 10 ton capacity at 55 ft. radius, 26½ tons at 21 ft. radius.



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FOR ROADMASTERS — The ideal crane for maintenance of way operations, handling tracks, frogs, switches — available *where* you need it, *when* you need it.

FOR SHOPS AND STORES—The choice of America's railroads for handling freight, wheels, stores—and repairs.

The RAIL-O-ROAD KRANE KAR has 4 speeds forward, 4 reverse, automatic braking of load and boom, stability without stabilizers or jacks, and handles loads at sides or front. By retracting flanged wheels, the RAIL-O-ROAD KRANE KAR leaves the rails at a siding or crossing. On its rubber tires, it has unexcelled features for indoors and outdoors operation . . . low overhead clearance, short turning radius, unusual maneuverability in close quarters. Gasoline or Diesel, one to 10 ton cap., 11 to 35 ft. booms, solid or pneumatic tires. Agents in principal cities.

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THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

RAIL-O-ROAD KRANE KAR

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"Railroading" is tough and so is the "Anchor" Chrome Clad steel tape. Durable, jet black markings are easy to read against a satin chrome surface that won't rust, crack, chip or peel. Specify "Anchor" Chrome Clad and you get the best. Write for free catalog.

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